11-2323

TM 11-2323

TO 10D1-3-11-1

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

PROJECTORS

PH-637/PFP

AND

PH-637A/PFP

This copy is a reprint which includes current pages from Changes IN FORCE.2,4,5,7,8 AND 9

DEPARTMENT OF THE ARMY • APRIL 1954

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TM 11-2323
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DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

PROJECTORS PH-637/PFP AND PH-637A/PFP, AND PROJECTOR, STILL PICTURE PH-637B/PFP

TM 11-2323
TO 10D1-3-11-1
CHANGES No. 2

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D.C., *17 May 1962*

TM 11-2323/TO 10D1-3-11-1, 7 April 1954, is changed as indicated so that the manual also applies to the following equipment:

Nomenclature	*Order No.*	*Serial No.*
Projector, Still Picture PH-637B/PFP	AF33(600)-43522	1-1915

Change the title of the manual to: PROJECTORS PH-637/PFP AND PH-637A/PFP, AND PROJECTOR, STILL PICTURE PH-637B/PFP.

Note. The parenthetical references to previous changes (example: "page 1 of C1") indicates that pertinent material was published in that changes.

Page 3, chapter 1. Add the following "Note" below the title of chapter 1.

Note. Projectors PH-637/PFP and PH-637A/PFP, and Projector, Still Picture PH-637B/PFP are similar. Information in this manual applies to all three projectors unless otherwise specified.

Paragraph 1. Make the following changes:

Subparagraph *a*, last sentence. Delete the last sentence.

Subparagraph *c*. Delete subparagraph *c* and substitute:

c. In this manual, Projector PH-637(*)/PFP represents Projectors PH-637/PFP and PH-637A/PFP, and Projector Still Picture PH-637B/PFP.

Paragraph 2. Delete paragraph 2 and substitute:

2. Forms and Records

a. Unsatisfactory Equipment Report. Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the commanding officer, U.S. Army Signal Materiel Support Agency, Fort Monmouth, N.J., as prescribed in AR 700-38.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army).

c. Preventive Maintenance Forms. Prepare DA Form DA 11-256, (Maintenance Checklist for Signal Equipment, Photographic Developer, Projector, Dryer, Contact and Projection Printer) in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists of Supply Manual 7, 8, or 9) direct to the Commanding Officer, U.S. Army Signal Materiel Support Agency, Fort Monmouth, N.J., to recommend changes in, or to comment on, basic issue items lists or repair parts and special tools lists.

e. Comments on Manual. Forward all other comments on this publication direct to the commanding officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N.J.

Page 4, paragraph 4. Delete paragraph 4 and substitute:

4. Table of Components

(figs. 2, 2.1, 3, and 4)

Quantity	Component	Dimensions (in.)			Weight (lb)
		Length	Width	Height	
1	Case, (carrying):				
	PH-637/PFP	23.5	15.5	26.5	25
	PH-637A/PFP	25.5	17.5	17.5	29
	PH-637B/PFP				
1	Housing:				
	PH-636/PFP	21.5	14.5	13.5	--------
	PH-637A/PFP (including roll attachment).	23.5	14.5	13.5	24
	PH-637B/PFP	21.5	13.5	13.5	25
1	Projection Head Assembly	24.5	9.25	8.25	6
	Projection Lamp[a]	(diameter: 2.5 in.)		5.5	0.25
1	Heat absorbing filter (PH-637B/PFP only).	5.5	5.5	--------	0.13
1	Roll attachment (PH-637/PFP only)	13.25	4	3	1.5
1	Lens cap	4.5	5	0.75	0.13
1	Support post	24.75	2	2	1.5
1	Projector stand[b]	20	12	18	--------
	Cellophane or plastic rolls[c]:				
	PG-637/PFP and PH-637A/PFP.	--------	10.5	2.25 (dia)	0.75
	PH-637B/PFP	--------	10.75	1.75 (dial)	--------
1	Aperture plate holder	12.25	11.63	0.75	0.25
3	Aperture plates (PH-637/PFP only)	10	10	0.25	0.5
	Aperature size: 3.69- by 4.63-inches 4.69- by 6.63-inches 6.69- by 8.69-inches				

For explanation of footnotes, see end of table.

Quantity	Component	Dimensions (in.)			Weight (lb)
		Length	Width	Height	
4	Aperture plates (PH-637A/PFP only). Aperture size: 3.69- by 4.63-inches 4.69- by 6.63-inches 6.69- by 8.69-inches 7.69- by 9.69-inches	10	10	0.25	0.5
5	Aperture plates (PH-637B/PFP only). Aperture size: 3.69- by 4.69-inches 4.69- by 6.69-inches 6.69- by 8.69-inches 7.75- by 9.66-inches 9.66- by 9.66-inches	10	10	0.25	0.5
	Power cable[d]	96	--------	--------	1
5 (packages)	Lens tissue	5.25	3.25	0.5	0.13

[a] One 500-watt lamp furnished with the PH-637/PFP; five 1,000 watt-lampe furnished with the PH-637A/PFP and PH-637B/PFP.

[b] Furnished only with some procurements of the PH-637A/PFP.

[c] One roll furnished with the PH-637/PFP and PH-637B/PFP; two rolls furnished with the PH-637A/PFP.

[d] The power cable is shipped separately with the PH-637/PFP and PH-637A/PFP; it is permanently connected to the PH-637B/PFP.

Paragraph 5. Make the following changes:

Heading. Change "(figs. 2, 3, 4, and 5)" to: (figs. 2, 2.1, 3, 4, and 5).

Subparagraph *a*. Delete the first sentence.

Line 3. After "637/PFP," add: and PH-637B/PFP.

Paragraph 5. Make the following changes:

Subparagraph *a*, line 1. After "condenser lens." add: In the PH-637B/PFP, a heat absorbing filter is located in front of the glass condensing lens.

Line 4. After "housing," add: of the PH-637/PFP and the PH-637A/PFP. The power cable of the PH-637B/PFP is permanently connected.

Page 7, paragraph 5, subparagraph *a*, line 5. After "glass condenser lens", add: heat absorbing filter (PH-637B/PFP).

Subparagraph *b*(2), line 3. Change the sentence to: The mirror housing contains the mirror and a window.

Page 8, paragraph 5, subparagraph *b*(2), line 1. Change "screw" to: knob.

Line 3. Delete the words "a black, crackle-finish," and substitute: an.

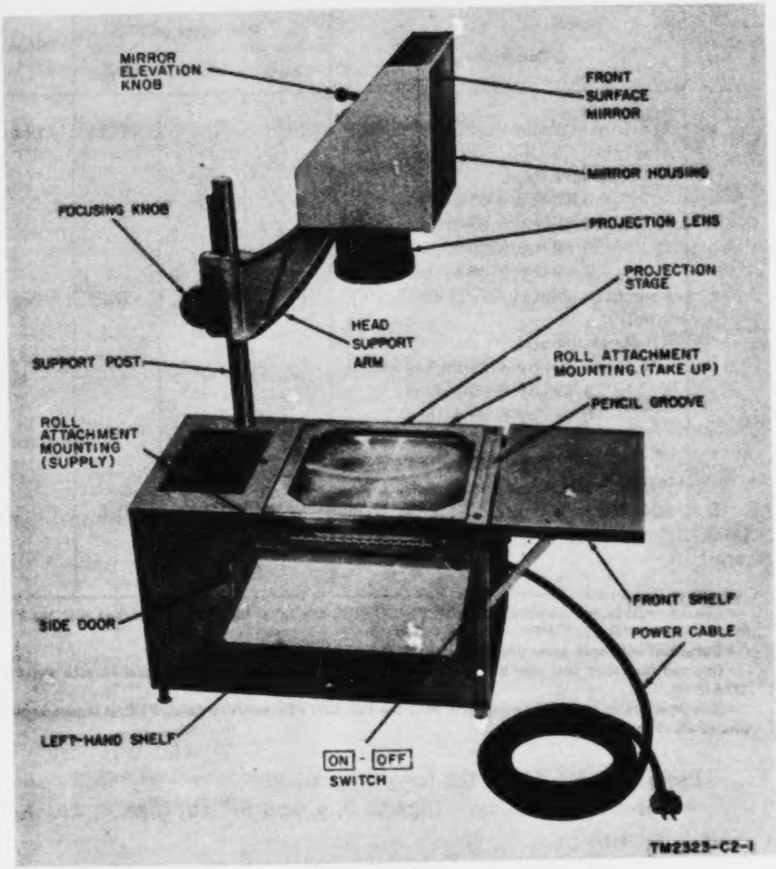
MIRROR ELEVATION KNOB
FRONT SURFACE MIRROR
MIRROR HOUSING
FOCUSING KNOB
PROJECTION LENS
PROJECTION STAGE
HEAD SUPPORT ARM
SUPPORT POST
ROLL ATTACHMENT MOUNTING (TAKE UP)
PENCIL GROOVE
ROLL ATTACHMENT MOUNTING (SUPPLY)
FRONT SHELF
POWER CABLE
SIDE DOOR
LEFT-HAND SHELF
ON - OFF
SWITCH
TM2323-C2-1

Figure 2.1. Projector, Still Picture PH–637B/PFP, less case, roll attachments, aperture plates, and aperture plate holder. (Added)

Subparagraph *c*, line 3. Change "projector" to: the PH–637/PFP and the PH–637A/PFP.

Line 4. After the last sentence, add: A similar power cable is used with the PH–637B/PFP; one end, however, is permanently connected to the projector and the plug at the other end is equipped with a male plug connector including a ground pin. Add the following note after subparagraph *c*:

Note.: A three-wire outlet is required to use the PH–637B/PFP. Subparagraph *d*. Delete the sentence that precedes the last sentence and substitute: The roll attachment is provided with captive screws (PH–637/PFP) or snap fasteners (PH–637B/PFP) by which it may be secured to the sides of the housing.

Subparagraph *e*(1), line 4. After the word "screws," add: on the PH-637/PFP and the PH-637A/PFP. On the PH-637B/PFP, two threaded bushings are provided at the top of the housing to accept the captive screws of the aperture plate holders.

Subparagraph *e*(2). Delete subparagraph *e*(2) and substitute:

(2) *Aperture plates.* The aperture plates supplied with projectors PH-637(*)/PFP are slightly different in size. Refer to paragraph 4 for the sizes of the aperture plates supplied with each Projector PH-637(*)/PFP.

Page 9, subparagraph *f*. Next to the last line. Change "(PH-637/PFP only)" to: (PH-637/PFP and PH-637B/PFP).

Paragraph 6, line 3. Change "PH-637A/PFP only" to: PH-637A/PFP and PH-637B/PFP.

Page 10, paragraph 9, line 1. Change the introductory sentence to: The differences between Projectors PH-637/PFP, PH-637A/PFP, and PH-637B/PFP are as follows:

Page 11, paragraph 9. Make the following changes:

Subparagraph *a*. Add subparagraph (3) after subparagraph (2):

(3) Projector PH-637B/PFP has no housing cover over the projection stage, and it has a slightly different housing shape. The left-hand shelf must be swung down before the PH-637B/PFP can be operated. The front shelf may be removed, but the pencil-groove section is part of the projection stage. The rear surface mirror adjusting screws can be reached from the sides of the projector housing without disassembly.

Subparagraph *b*, line 2. After "PH-637A/PFP," add: and the PH-637B/PFP.

Line 5. Delete the third sentence and substitute: (A heat-absorbing filter is supplied with the PH-637B/PFP.)

Subparagraph *c*, line 5. After "PH-637A/PFP" add: and the PH-637B/PFP.

Add subparagraph *c*.1 after subparagraph *c*:

c.1. The power cable supplied with Projectors PH-637/PFP and PH-637A/PFP are removable and have a two-wire connector on each end. The power cable on the PH-637B/PFP has one end permanently connected and a three-wire connector on the free end.

Subparagraph *d*, line 2. After "PH-637A/PFP," add: and PH-637B/PFP.

Page 12, paragraph 10. Make the following changes:

Subparagraph *a*, line 6. Delete the word "wooden".

Subparagraph *a*(1). Add the following note after subparagraph (1):

Note. If the equipment is received domestically packed (less the wire-bound box), eliminate the steps in (2) through (5) below and proceed directly to the step in (6) below.

Page 14, paragraph 11. Make the following changes:

Subparagraph *b*, second sentence. Change "slanted top edge" to: support post end.

Subparagraph *c*. Delete the third and fourth sentences.

Subparagraph *e*, line 1. After "captive screw," add: (PH-637/PFP and PH-637A/PFP).

First sentence. After the first sentence, add: On PH-637B/PFP, the rear door is held by a snap-fit fastener; to open the rear door, pull out on the rear door fastener.

Line 8. After "Place the lamp cap," add: (PH-637/PFP and PH-637A/PFP).

Last sentence. After "captive screw," add: (PH-637/PFP and PH-637A/PFP).

Add the following sentence to subparagraph *e*: On the PH-637B/-PFP, close the rear door by pressing on the rear door fastener until it snaps into position.

Page 15, paragraph 11. Make the following changes:

Subparagraph *f*, line 1. After "PH-637/PFP," add: and the PH-637B/PFP.

Last sentence. After the last sentence, add: On the PH-637B/PFP, fold the side shelf down to its extended position.

Subparagraph *g*, line 2. After "PH-637/PFP," add: or the PH-637B/PFP.

Line 3. Change "captive screws" to: fasteners.

Subparagraph *h*. Delete subparagraph *h* and substitute:

h. On the PH-637/PFP and the PH-637A/PFP, plug the female connector on the end of the power cable into the receptacle on the front of the projector housing. On Projector PH-637(*)/PFP, plug the male connector into a 115- to 120-volt, 60-cycle, single-phase, ac power source.

Note. When using the PH-637B/PFP, a three-wire outlet is required for operation.

Page 16, paragraph 12, chart, "Location" column, lines 12 and 16. Change "(PH-637/PFP)" to: (PH-637/PFP and PH-637B/PFP).

Page 19, paragraph 16. Make the following changes:

Subparagraph *a*, line 2. Change "PH-637/PFP" to: PH-637/PFP and PH-637B/PFP.

Subparagraph *a*(1). Delete subparagraph (1) and substitute:

(1) *PH-637/PFP and PH-637B/PFP*. Attach the takeup unit to the left side of the projector housing so that the crank handle is toward the front. Attach the supply unit to the right side. On the PH-637/PFP, the roll attachment units are held to the projector housing by captive screws; on the PH-637B/PFP, they are held by snap-fit plastic fasteners. Mount the roll of cellophane or plastic on the supply unit by pulling outward on the crank (PH-637/PFP) or on the knob (PH-637B/PFP) and inserting the roll so that it is held at each end by a pivot. Draw the sheet of plastic or cellophane over the projection stage an

attach it to the takeup roll with Scotch tape. When the takeup crank is turned counterclockwise, the cellophane or plastic material is wound on the takeup roll.

Page 39, paragraph 37, chart. In the "How to check" column, line 6. Change "(PH-637/PFP only)" to: (PH-637/PFP and PH-637B/PFP).

Page 43, paragraph 39 (page 1 of C1). Make the following changes:

Subparagraph *c*(1). Add subparagraph (1.1) after subparagraph (1).

(1.1) On the PH-637B/PFP, remove the six bottom cover mounting screws (fig. 29.1) that secure the bottom cover, and lift off the bottom cover to reach the blower motor.

Subparagraph *c*(2). Add subparagraph (2.1) after subparagraph (2).

(2.1) On the PH-637B/PFP, reinstall the bottom cover (fig. 29.1) and secure it with the bottom cover mounting screws removed in (1.1) above.

Page 46, paragraph 47, chart. Make the following changes:

In "Item" column, line 3. Change "(PH-637/PFP)" to: (PH-637/PFP and PH-637B/PFP).

In the "Action or condition" column, line 3. Delete "Raise to" and substitute: Place in.

In "Action or condition" column, line 12. Change "Turn" to: Move.

In "Corrective measures" column, line 4, add the following after the word "shelf": (PH-637/PFP or PH-637B-PFP).

Page 48, paragraph 51. Make the following changes:

Subparagraph *a*. Add the following after the first sentence: On the PH-637B/PFP, a heat absorbing filter is placed between the condensing lens and the rear-surface mirror.

Subparagraph *b*, line 2. Change "Projector PH-637A/PFP" to: Projectors PH-637A/PFP and PH-637B/PFP.

Last sentence. Add the following after the last sentence: In the PH-637B/PEP, the motor drives two blowers, one on each end of the motor shaft.

Subparagraph *c*. Delete subparagraph *c* and substitute:

c. Power Supply (fig. 25). Projector PH-637(*)/PFP operates from a 115- to 120-volt, 60-cycle, single-phase, ac power source. The PH-637/PFP and the PH-637A/PFP require a two-wire service outlet; the PH-637B/PFP requires a three-wire service outlet. A two-way ON-OFF switch is on the front of Projector PH-637(*)/PFP. On the PH-637/PFP and the PH-637A/PFP, a male receptacle connector for the power cable is mounted on the front of the housing. There is no receptacle on the PH-637B/PFP because the power cable is permanently connected inside the housing. On all projectors, the switch is wired in series with one side of the line and the parallel-wired blower motor and projection lamp.

Figure 25. Add the following note to figure 25.

NOTE:

THE PH-637B/PFP IS EQUIPPED WITH A MALE PLUG CONNECTOR INCLUDING A GROUND PIN.

Page 49, paragraph 51. Make the following changes:

Subparagraph *d*, line 2. Change "(PH-637/PFP only)" to: (PH-637/PFP and PH-637B/PFP).

Subparagraph *f*, line 3. Delete "screwed to" and substitute: mounted on.

Page 51, paragraph 55. Make the following changes:

Subparagraph *a*(1), line 1. Change "PH-637/PFP" to: PH-637/PFP and PH-637B/PFP.

Subparagraph *a*(2). After the last sentence, add: To remove the left-hand shelf of the PH-637B/PFP (fig. 26.1), first remove the three retainer mounting screws that hold the retainer strips to each side of the projection stage and lift off the retainer strips. Carefully lift the projection stage off the housing. Remove the three hinge mounting screws and sheet metal nuts that hold the shelf hinge to the housing; remove the left-hand shelf.

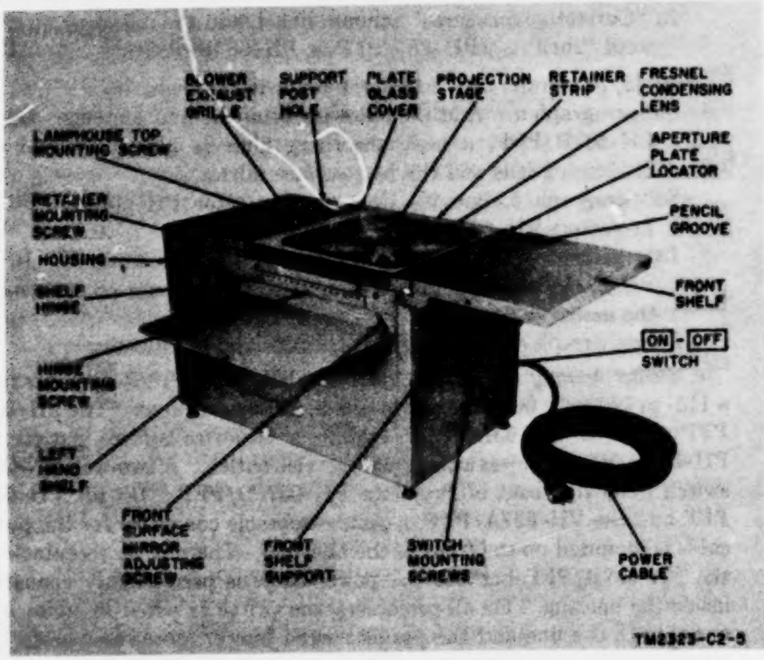
BLOWER EXHAUST GRILLE
SUPPORT POST HOLE
PLATE GLASS COVER
PROJECTION STAGE
RETAINER STRIP
FRESNEL CONDENSING LENS
LAMPHOUSE TOP MOUNTING SCREW
APERTURE PLATE LOCATOR
RETAINER MOUNTING SCREW
PENCIL GROOVE
HOUSING
SHELF HINGE
FRONT SHELF
ON - OFF SWITCH
HINGE MOUNTING SCREW
LEFT HAND SHELF
FRONT SURFACE MIRROR ADJUSTING SCREW
FRONT SHELF SUPPORT
SWITCH MOUNTING SCREWS
POWER CABLE
TM2323-C2-5

Figure 26.1. Projector, Still Picture PH-637B/PFP, projector housing. (Added)

Page 53, paragraph 55*b*(2). Add subparagraph (3) after subparagraph (2):

(3) *Projector, Still Picture PH-637B/PFP.*

(*a*) Remove the retainer mounting screws (fig. 26.1) and the retainer strips.

(*b*) Lift off the plate glass and place it on a clean, smooth, flat surface.

(*c*) Carefully lift the projection stage (with the Fresnel condensing lens in place) off the housing.

(*d*) Free the Fresnel condensing lens by pushing in on the spring clips. Note the position of the Fresnel condensing lens and carefully lift it out of its stage. Be careful not to scratch, bend, or break the Fresnel condensing lens.

(*e*) Replace the Fresnel condensing lens, projection stage, and plate glass cover by reversing the instructions given in (*a*) through (*d*) above.

Page 54, paragraph 55*c*, heading. Change heading to: *Reflector. Projectors PH-637/PFP and PH-637A/PFP.*

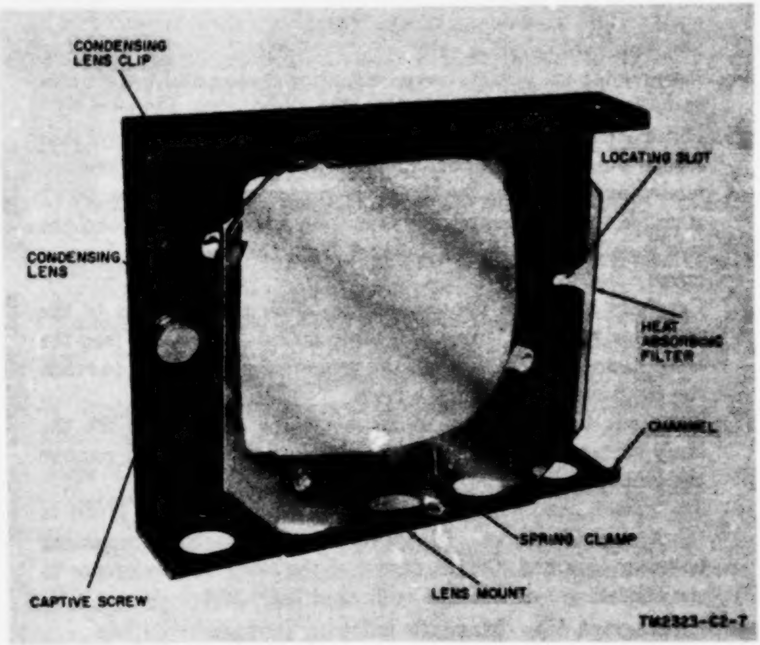
CONDENSING LENS CLIP
LOCATING SLOT
CONDENSING LENS
HEAT ABSORBING FILTER
CHANNEL
SPRING CLAMP
CAPTIVE SCREW
LENS MOUNT
TM2323-C2-7

Figure 28.1. Condensing lens and heat absorbing filter, PH-637B/PFP. (Added)

Page 55, paragraph 55*c*. Add subparagraph *c*.1 after subparagraph *c*:

c.1. *Reflector, Projector, Still Picture PH-637B/PFP*. Open the rear door of the projector (fig. 28). Unscrew the two reflector retaining screws and carefully lift off the reflector. To replace the reflector, position the reflector and secure it with the reflector retaining screws previously removed. Close the rear door.

Subparagraph *d*(3), last sentence. Add the following after the last sentence: In the PH-637B/PFP, a heat-absorbing filter (fig. 28.1) is mounted in front of the condensing lens. Remove the heat-absorbing filter by pulling it laterally from the two channels that hold it; pull away from the captive screw. Removal of the condensing lens in the PH-637B/PFP is the same as for the PH-637A/PFP.

Subparagraph *e*, heading. Change the heading to: *Lamp Socket, Projectors PH-637/PFP and PH-637A/PFP* (figs. 29 and 30).

Subparagraph *e*. Add subparagraph *e*.1 after subparagraph *e*:

e.1. *Lamp Socket, Projector, Still Picture PH-637B/PFP*.

(1) Open the rear door of the projector and then open the lamp house door (fig. 7). Remove the projection lamp from its socket.

(2) Rack the projection head assembly (fig. 1) up off the support post, and set it carefully to one side.

(3) Lay the housing on its side.

(4) Remove the six bottom cover mounting screws and the bottom cover from the projector housing (fig. 29.1).

(5) Remove the four lamphouse bottom cover mounting screws that secure the lamphouse bottom cover and the one lamphouse top mounting screw from the top of the projector housing (fig. 26.1). Remove the four lamphouse mounting bolts (fig. 29.1) and the two lamphouse adjusting bracket from the lamphouse bottom cover.

(6) Carefully work the lamphouse (fig. 29.2) partially out of the projector housing; loosen the cable clamp screws and feed the lamp filament wires through the grommet, as required, to reach the lamp socket attaching screws.

(7) Take out the two lamp socket attaching screws and lift the lamp socket free. Disconnect the electrical leads and remove the socket.

(8) To replace the lamp socket, reverse the instructions given in (1) through (7) above. Whenever the four lamphouse mounting bolts are loosened, the alignment of the lamp with reference to the condenser lens must be rechecked (par. 59*f*).

Page 57, paragraph 55*f*. Make the following changes:

Subparagraph (1). Add the following note after subparagraph (1):

Note. On the PH-637B/PFP, the motor mountings are held by sheet metal screws; no washers or nuts are used.

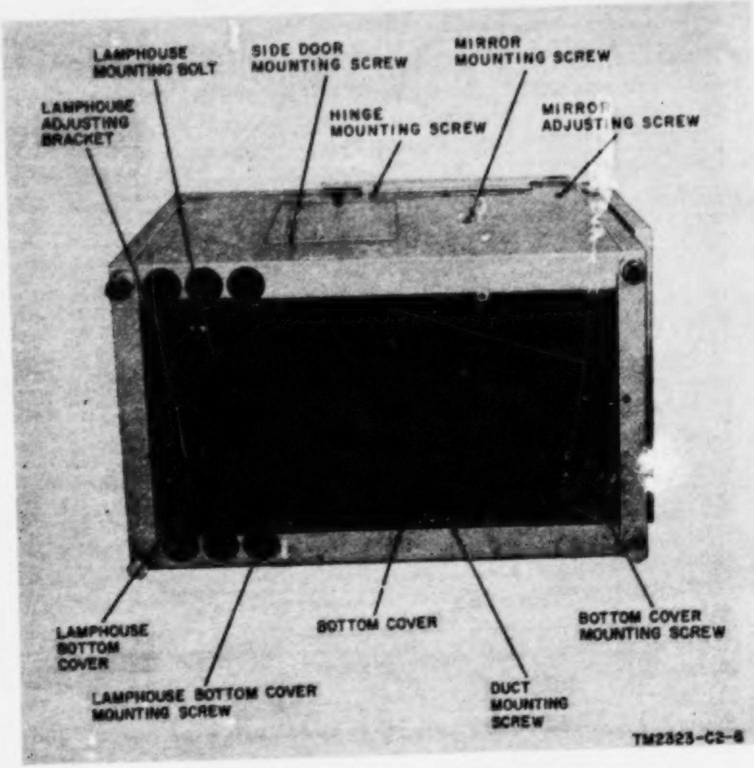
LAMPHOUSE MOUNTING BOLT
SIDE DOOR MOUNTING SCREW
MIRROR MOUNTING SCREW
LAMPHOUSE ADJUSTING BRACKET
HINGE MOUNTING SCREW
MIRROR ADJUSTING SCREW
LAMPHOUSE BOTTOM COVER
BOTTOM COVER
BOTTOM COVER MOUNTING SCREW
LAMPHOUSE BOTTOM COVER MOUNTING SCREW
DUCT MOUNTING SCREW
TM2323-C2-6

Figure 29.1. Projector, Still Picture PH–637B/PFP, bottom view. (Added)

Subparagraph (3), line 1. After "mountings," add: on the PH–637/PFP and the PH–637A/PFP.

Add subparagraph (3.1) after subparagraph (3).

(3.1) On the PH–637B/PFP, a blower is mounted on each end of the motor shaft. To remove the motor mountings, remove the two blower mounting screws that secure each motor mounting to its respective blower.

Page 58, paragraph 55. Make the following changes:

Subparagraph *f*(6), note. Delete the note and substitute:

Note. The PH–637A/PFP and the PH–637B/PFP each have a duct attached to the inside of the bottom cover. On the PH–637A/PFP, the duct is fastened by clips and on the PH–637B/PFP it is fastened with screws.

Subparagraph *h*, heading. After "*Connector,*" add: (*PH–637/PFP and PH–637A/PFP*)

Page 59, paragraph 55. Make the following changes:

Subparagraph *i*, heading. After "*Support,*" add: (*PH–637/PFP and PH–637A/PFP*)

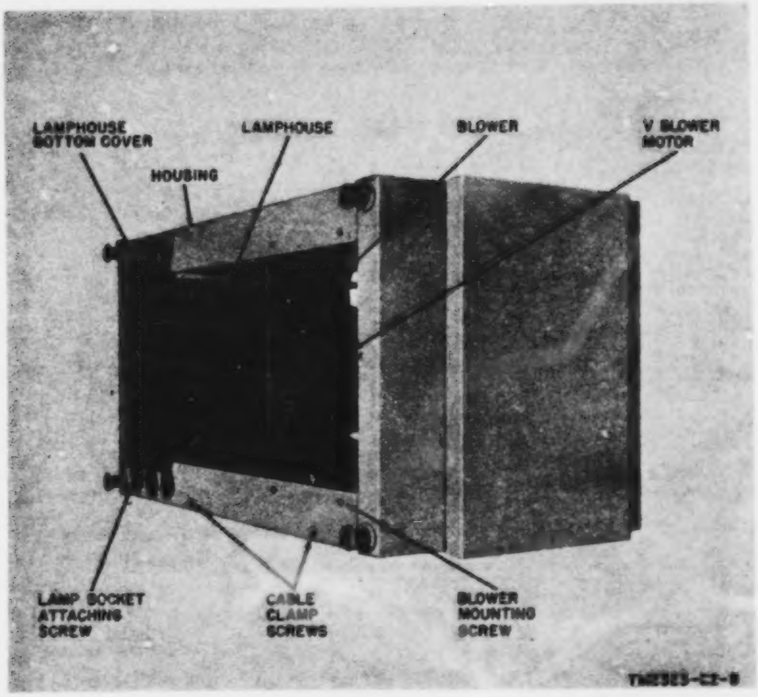
LAMPHOUSE BOTTOM COVER
LAMPHOUSE
BLOWER
V BLOWER MOTOR
HOUSING
LAMP SOCKET ATTACHING SCREW
CABLE CLAMP SCREWS
BLOWER MOUNTING SCREW

Figure 29.2. Projector, Still Picture PH–637B/PFP with bottom removed. (Added)

Add subparagraph *i*.1 after subparagraph *i*:

i.1. *Rear Surface Mirror and Mirror Support, (PH–637B/PFP).*

(1) Remove the projection stage plate glass cover and the Fresnel condensing lens (*b* above).

(2) Remove the clips that hold the rear surface mirror (fig. 24) in position. Carefully lift the rear surface mirror free.

(3) To remove the rear surface mirror support, take out the mirror mounting screws and washers (fig. 29.1) and the mirror adjusting screws and washers. Lift out the rear surface mirror support.

(4) To replace the rear surface mirror support and mirror, reverse the disassembly instructions given in (1), (2), and (3) above. Whenever the rear surface mirror or rear surface mirror support is moved, the rear surface mirror must be realigned (par. 59*d*(2)).

Subparagraph *j*, line 1. After "a glide" add: on the PH–637/PFP and the PH–637A/PFP

Last sentence. Add the following after the last sentence: To remove the glide on the PH–637B/PFP, unscrew the glide counterclockwise.

Subparagraph *k*, line 2. After "knob," add: on the PH–637/PFP and the PH–637A/PFP

Last sentence. After the last sentence add: To remove the support post clamping knob on the PH–637B/PFP, unscrew the knob counterclockwise.

Subparagraph *l*, heading. After "*Crank*", add: PH–637/PFP and PH–637A/PFP

Add subparagraph *m* after subparagraph *l*:

m. Crank, PH–637B/PFP (fig. 32.1). To disassemble the crank, take out the screw in the head of the crankshaft and pull the crank pivot out of its mounting hole in the bracket. To disassemble the tension pivot, unscrew the knob from the end of the tension pivot shaft, pull the pivot out of its mounting hole in the bracket, and remove the spring. To replace the pivots reverse the disassembly instructions.

Figure 32, caption. Add the following after "*disassembled*": *PH–637/PFP and PH–637A/PFP*.

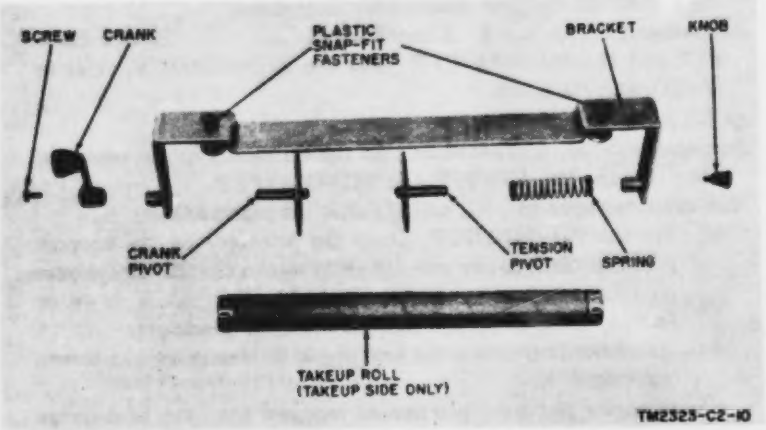

Figure 32.1. Roll attachment disassembled, PH–637B/PFP. (Added)

Page 60, paragraph 56. Make the following changes:

Subparagraph *a*. Add the following after the last sentence: On the PH–637B/PFP, the window is set in the frame but is not taped.

Subparagraph *b*(2), line 1. After "spring clips," add: (PH–637/PFP and PH–637A/PFP) or clamp (PH–637B/PFP)

Subparagraph *b*(4), first sentence. At the beginning of the sentence, add: On the PH–637/PFP and the PH–637A/PFP

Add subparagraph (4.1) after subparagraph (4):

(4.1) On the PH–637B/PFP, unscrew the elevation knob and take out the two screws that hold the mirror support at the top of the projection head housing. Lift the support out of the housing.

Page 61, paragraph 56*c*(3). Add the following caution above the note:

***Caution:* The PH-637B/PFP is not equipped with the setscrew described in the note below. Be careful to hold the lens firmly while loosening the split ring locking screw. Fold the left-hand shelf over the projection stage; this gives partial protection for the Fresnel condensing lens and front surface mirror.**

Page 63, paragraph 59. Make the following changes:

Subparagraph *b*. Add the following note after subparagraph *b*.

Note. The adjustment procedure described in *c* below applies only to the PH-637/PFP and the PH-637A/PFP and is not required on the PH-637B/PFP.

Subparagraph *d*(1), first sentence. After the first sentence, add: On the PH-637B/PFP, loosen the support post locking knob and the locating plug clamping screw (fig. 27).

Page 64, subparagraph *d*(1), last sentence. Delete the last sentence and substitute: Secure the support post.

Subparagraph *d*(2), first sentence. After the first sentence, add: On the PH-637B/PFP, no disassembly is required.

Subparagraph *f*(3), line 2. After "follows," add: for the PH-637/-PFP and the PH-637A/PFP. For the PH-637B/PFP, refer to (*d*), (*e*), and (*f*) below.

Page 64, paragraph 59*f*(3)(*c*).

Subparagraph (*c*), first sentence. At the beginning of the sentence, add: On the PH-637/PFP and PH-637A/PFP

Add subparagraphs (*d*), (*e*), and (*f*) after subparagraph (*c*).

(*d*) For the PH-637B/PFP, grasp the projector by the support post and tilt it to one side. Slightly loosen the four lamphouse mounting bolts (fig. 29.1). Slide the lamphouse back or forward as required and tighten the bolts handtight.

(*e*) Stand the projector erect and check the image on the screen (para 59*f*)

(*f*) Readjust the lamp position as required until the best image is obtained on the screen. Tighten the bolts with a wrench.

***Caution:* Be careful not to force the bolts as this could damage the lamphouse mounting brackets.**

Page 65, paragraph 61. Make the following changes:

Subparagraph *a*, line 1. Change "turned" to: moved.

Subparagraph *e*, last sentence. Add the following after the last sentence: The side shelf of PH-637B/PFP should not be loose.

Page 66, paragraph 62, line 2. After "connector," add: of the PH-637/PFP and the PH-637A/PFP.

Second sentence. Add the following after the second sentence: On the PH-637B/PFP, measure the resistance from either *hot* contact of the power cable connector to the ground connection at the ON-OFF switch, with the switch open.

Page 70. Delete paragraph 8.

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  11-587
  11-592
  11-597
  19-256
  19-316

44–7	44–102
44–16	44–112
44–70	

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320–50.

TECHNICAL MANUAL

PROJECTORS PH-637/PFP AND PH-637A/PFP, AND PROJECTORS, STILL PICTURE PH-637B/PFP AND PH-637C/PFP

TM 11-2323	HEADQUARTERS, DEPARTMENT OF THE ARMY
CHANGES No. 4	WASHINGTON 25, D.C., *22 March 1963*

TM 11-2323, 7 April 1954, is changed as indicated so that the manual also applies to the following equipment:

Nomenclature	*Order No.*	*Serial No.*
Projector, Still Picture PH-637C/PFP	AF33(657)8441	1-1856

Change the title of the manual to: PROJECTORS PH-637/PFP AND PH-637A/PFP, AND PROJECTORS, STILL PICTURE PH-637B/PFP AND PH-637C/PFP.

Note. The parenthetical references to previous changes (example: "page 1 of C1") indicates that pertinent material was published in that changes.

Add "and the PH-637C/PFP" after "PH-637B/PFP" in the following places:

Page 8, paragraph 5*c* (page 4 of C2), last sentence, and two places in the note.

Page 48, paragraph 51*c* (page 7 of C2), lines 4 and 8.

Page 63, paragraph 59*b* (page 14 of C2), note.

Page 64, paragraph 59*f*(3) (page 14 of C2), first sentence.

Page 65, paragraph 61*e* (page 14 of C2), last sentence.

Page 66, paragraph 62 (page 14 of C2), third sentence.

Page 2. Add figure 1.1 after figure 1:

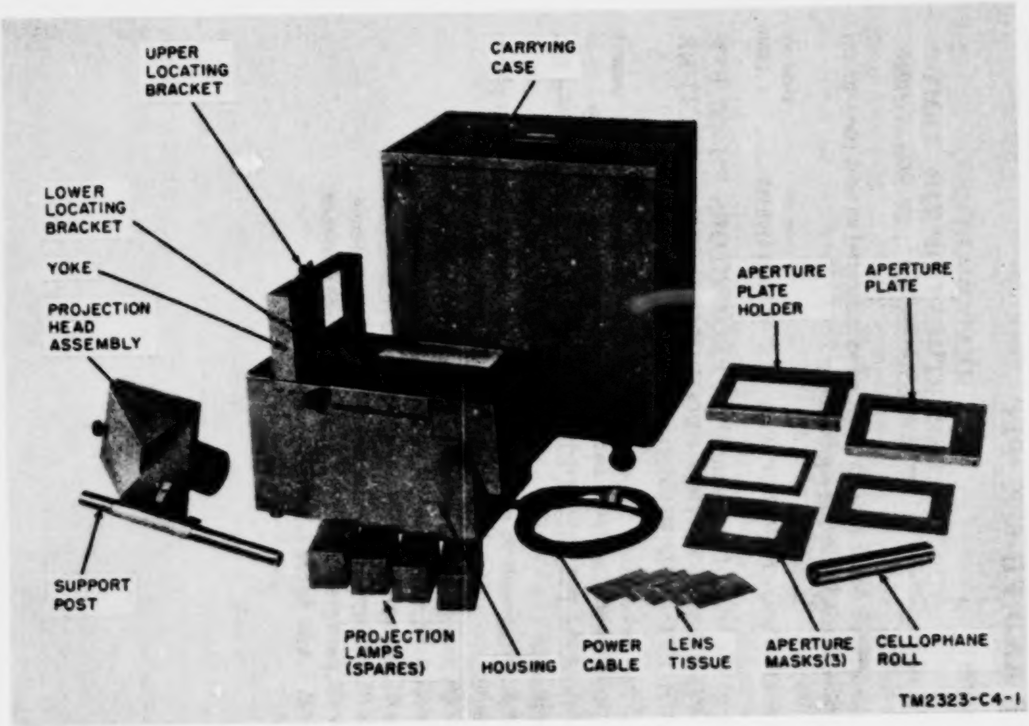
UPPER LOCATING BRACKET
CARRYING CASE
LOWER LOCATING BRACKET
YOKE
PROJECTION HEAD ASSEMBLY
APERTURE PLATE HOLDER
APERTURE PLATE
SUPPORT POST
PROJECTION LAMPS (SPARES)
HOUSING
POWER CABLE
LENS TISSUE
APERTURE MASKS(3)
CELLOPHANE ROLL
TM2323-C4-1

Figure 1.1. *Projector, Still Picture PH–637C/PFP, component parts.*

Page 3, chapter 1 (page 1 of C2), note. Delete the note below the title of chapter 1 and substitute:

Note. Projectors PH-637/PFP and PH-637A/PFP, and Projector, Still Picture PH-637B/PFP and PH-637C/PFP are similar. Information in this manual applies to all four projectors unless otherwise specified.

Paragraph 1*c* (page 1 of C2), line 2. Delete "Projector Still Picture PH-637B/PFP." and substitute: Projectors, Still Picture PH-637B/PFP and PH-637C/PFP.

Add paragraph 1.1 after paragraph 1.

1.1. Index of Publications

Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet No. 310-4 is an index of current technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.), and the latest changes to and revisions of each publication.

Paragraph 2 (page 1 of C3). Delete paragraph 2 and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Comments on Manual. Forward all comments on this publication direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N.J. (DA Form 1598 (Record of Comments on Publications), DA Form 2496 (Disposition Form), or letter may be used.)

Page 4, paragraph 4 (page 2 of C2). Delete paragraph 4 and substitute:

4. Table of Components

(figs. 1.1, 2, 2.1, 3, and 4)

Quantity	Component	Dimensions (in.)			Weight (lb)
		Depth	Width	Height	
1	Case, carrying:				
	PH-637/PFP	23. 5	15. 5	26. 5	25
	PH-637A/PFP and PH-637B/PFP.	25. 5	17. 5	17. 5	29
	PH-637C/PFP	26. 25	17. 56	29. 25	32
1	Housing:				
	PH-637/PFP	21. 5	14. 5	13. 5	
	PH-637A/PFP (including roll attachment).	23. 5	14. 5	13. 5	24
	PH-637B/PFP	21. 5	13. 5	13. 5	25
	PH-637C/PFP	23. 63	14. 5	21. 25	21
1	Projection head assembly:				
	PH-637/PFP, PH-637A/PFP, and PH-637B/PFP.	24. 5	9. 25	8. 25	6
	PH-637C/PFP	16. 75	7. 75	15	8. 5
	Projection lamp[a]	-------	2. 5 (dia)	5. 5	0. 25
1	Roll attachment (PH-637/PFP only).	13. 25	4	3	1. 5
1	Takeup roll (PH-637C/PFP only).	-------	10. 8	1 (dia)	0. 1
	Cellophane or plastic rolls:[b]				
	PH-637/PFP and PH-637A/PFP.	-------	10. 5	2. 25 (dia)	0. 75
	PH-637B/PFP	-------	10. 75	1. 75 (dia)	
	PH-637C/PFP	-------	10. 5	1. 75 (dia)	0. 75
1	Lens cap:				
	PH-637/PFP, PH-637A/PFP, and PH-637B/PFP.	4. 5	5	0. 75	0. 13
	PH-637C/PFP	-------	-----------	4. 03 (dia)	0. 13
1	Support post:				
	PH-637/PFP, PH-637A/PFP, and PH-637B/PFP.	24. 75	2	2	1. 5
	PH-637C/PFP	18	1. 19	2	1. 25
1	Projector stand[c]	20	12	18	
1	Aperture plateholder:				
	PH-637/PFP, PH-637A/PFP, and PH-637B/PFP.	12. 25	11. 63	0. 75	0. 25

See footnotes at end of table.

4. Table of Components—Continued

Quantity	Component	Dimensions (in.)			Weight (lb)
		Depth	Width	Height	
	PH-637C/PFP	13. 13	12. 38	0. 75	0. 1
3	Aperture plates (PH-637/PFP only). Aperture size: 3.69 by 4.63 inches 4.69 by 6.63 inches 6.69 by 8.69 inches	10	10	0. 25	0. 5
4	Aperture plates (PH-637A/PFP only). Aperture size: 3.69 by 4.63 inches 4.69 by 6.63 inches 6.69 by 8.69 inches 7.69 by 9.69 inches	10	10	0. 25	0. 5
5	Aperture plates (PH-637B/PFP only). Aperture size: 3.69 by 4.69 inches 4.69 by 6.69 inches 6.69 by 8.69 inches 7.75 by 9.66 inches 9.66 by 9.66 inches	10	10	0. 25	0. 5
3	Aperture masks (PH-637C/PFP only). Aperture size: 3.69 by 4.69 inches 4.69 by 6.69 inches 6.69 by 8.69 inches	10	10	0. 25	0. 1
1	Aperture plate (PH-673C/PFP only).	13. 13	12. 38	0. 75	0. 1
	Power cable: [d]				
	PH-637/PFP, PH-637A/PFP, and PH-637B/PFP.	96 (lg)			1
	PH-637C/PFP	180 (lg)			1. 5
5 (packages)	Lens tissue	5. 25	3. 25	0. 5	0. 13

---

[a] One 500-watt lamp furnished with the PH-637/PFP; five 1,000-watt lamps furnished with the PH-637A/PFP, the PH-637B/PFP, and the PH-637C/PFP.

[b] One roll furnished with the PH-637/PFP and the PH-637B/PFP; two rolls furnished with the PH-637A/PFP and the PH-637C/PFP.

[c] Furnished only with some procurements of the PH-637A/PFP.

[d] The power cable is shipped separately with the PH-637/PFP and PH-637A/PFP; it is permanently connected to the PH-637B/PFP and the PH-637C/PFP.

Paragraph 5. Make the following changes:

Heading (page 3 of C2). Change "(figs. 2, 2.1, 3, 4, and 5)" to: (fig. 2, 2.1, 2.2, 3, 4, 7, and 7.1).

Subparagraph *a* (page 3 of C2). Delete subparagraph *a* and substitute:

a. Housing.

(1) Two shelves are provided for the PH-637/PFP, the PH-637B/PFP, and the PH-637C/PFP; the one at the front is used as an armrest, and the one at the left side is used to hold copy, notes, and other lecture materials. The PH-637A/PFP has a shelf at the left side and a hinged projection-stage cover which extends out over the front of the projector to form a shelf.

(2) A door at the rear, held in the closed position by a knurled captive screw, opens to expose a reflector and projection lamp and, in the PH-637C/PFP, a heat-absorbing filter located in front of the projection lamp.

(3) A door at the left side of the PH-637/PFP, the PH-637A/PFP, and the PH-637B/PFP gives access to a glass condenser lens, a rear surface mirror, and the bottom of a Fresnel condenser lens and, in the PH-637B/PFP, a heat-absorbing filter located in front of the glass condenser lens. (On the PH-637C/PFP, access to the rear surface mirror, the glass condenser lens, and the bottom of the Fresnel condenser lens is gained by raising the projection stage from the front.)

(4) A blower, which cools the projection lamp when it is turned on, is located in the lower front part of the housing.

(5) An on-off switch and a receptacle connector for the power cable are on the front of the housing of the PH-637/PFP and the PH-637A/PFP. On the PH-637B/PFP and the PH-637C/PFP, the power cord is permanently connected.

(6) On top of the housing of the PH-637/PFP, the PH-637A/PFP, and the PH-637B/PFP, are the projection stage and a 1¼-inch hole through which the support post is inserted. On top of the housing of the PH-637C/PFP are the projection stage and a permanently attached yoke through which the support post is inserted.

(7) The projection stage of the PH-637/PFP, the PH-637A/PFP, and the PH-637B/PFP is a plate glass cover, held in place over a 10- by 10-inch opening by retaining strips. The Fresnel condenser lens rests in grooves under the plate glass cover. On the PH-637C/PFP, the projection stage is a sheet metal unit to which is attached the plate glass cover and the Fresnel condenser lens. The unit is held in place by two knurled projection-stage retaining screws located on both sides of the housing, toward the rear, allowing the projection stage to pivot up and to the rear.

(8) In front of the projection stage, on top of the housing, is a groove that holds a grease pencil used for marking cellophane or plastic held on the projection stage. (On the PH-637C/PFP, the pencil groove is formed by the converging angles of the sheet metal at the front of the projection stage and the rear of the front shelf when the front shelf is raised.)

(9) On the right side of the housing of the PH-637/PFP, the PH-637A/PFP, and the PH-637B/PFP, next to the support post hole, is a clamping knob used to lock the support post in position. (On the PH-637C/PFP, the clamping knob is located on the rear of the yoke.)

(10) The housing contains an optical system composed of a reflector, a projection lamp, a glass condenser lens, a heat-absorbing filter (PH-637B/PFP and PH-637C/PFP only), a rear surface mirror, a Fresnel condenser lens, and the glass cover of the projection stage. The housings of the PH-637A/PFP and the PH-637C/PFP also contain a cellophane roll attachment (*d* below).

Page 5 (page 4 of C 2). Add figure 2.2 after figure 2.1:

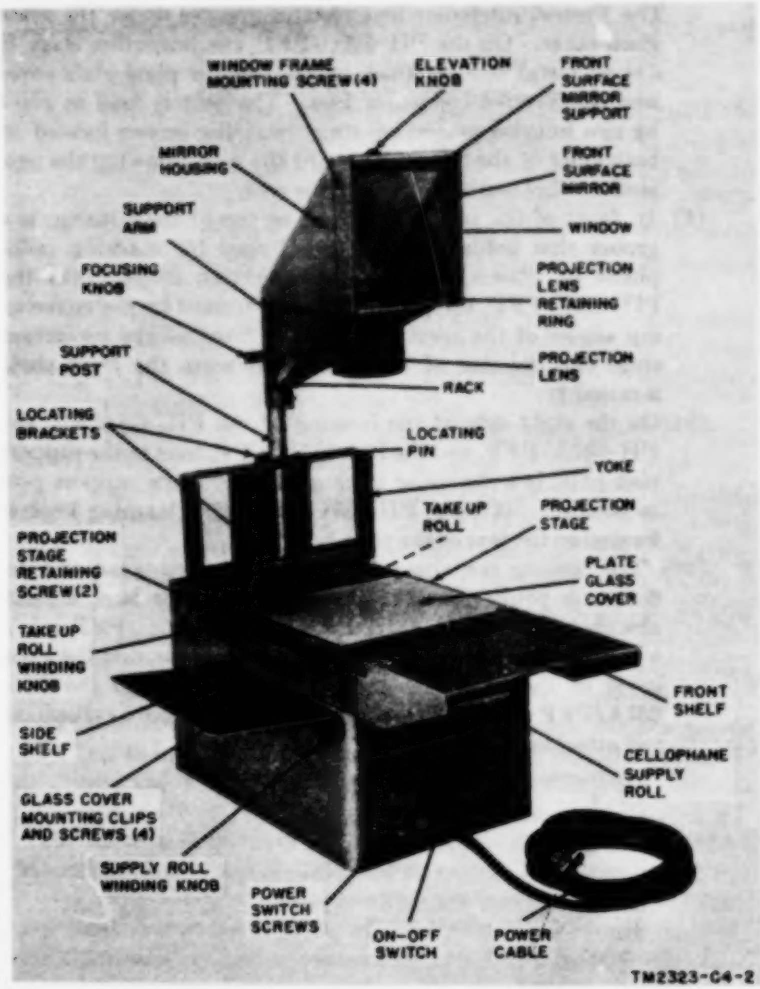
WINDOW FRAME MOUNTING SCREW (4)
ELEVATION KNOB
FRONT SURFACE MIRROR SUPPORT
MIRROR HOUSING
FRONT SURFACE MIRROR
SUPPORT ARM
WINDOW
FOCUSING KNOB
PROJECTION LENS RETAINING RING
SUPPORT POST
PROJECTION LENS
RACK
LOCATING BRACKETS
LOCATING PIN
YOKE
TAKE UP ROLL
PROJECTION STAGE
PROJECTION STAGE RETAINING SCREW (2)
PLATE GLASS COVER
TAKE UP ROLL WINDING KNOB
FRONT SHELF
SIDE SHELF
CELLOPHANE SUPPLY ROLL
GLASS COVER MOUNTING CLIPS AND SCREWS (4)
SUPPLY ROLL WINDING KNOB
POWER SWITCH SCREWS
ON-OFF SWITCH
POWER CABLE
TM2323-C4-2

Figure 2.2. Projector, Still Picture PH-637C/PFP (assembled) less case, aperture plates, and accessories

Page 7, paragraph 5. Make the following changes:

Subparagraph *b*(1). Delete the heading and substitute:

Head-support post, Projectors PH-637/PFP and PH-637A/PFP, and Projector, Still Picture PH-637B/PFP.

Add subparagraph (1.1) after subparagraph (1):

(1.1) *Head-support post, Projector, Still Picture PH-637C/PFP* (fig. 2.2). The support post has a rack secured to the upper end by two screws. The lower end of the support post fits through two adjustable locating brackets in the yoke. The projecting studs of a locating pin in the support post fit in two notches cut into the flanges of the upper locating bracket on the top of the yoke. The support post is locked into position by a clamping knob located on the rear plate of the yoke.

Subparagraph *b*(2). Delete the heading and substitute:

Projection head assembly, Projectors PH-637/PFP and PH-637A/PFP, and Projector, Still Picture PH-637B/PFP.

Page 8, paragraph 5*b*(2). Add subparagraph (3) after subparagraph (2):

(3) *Projection head assembly, Projector, Still Picture PH-637C/PFP* (fig. 2.2). The projection head assembly consists of a mirror housing, a projection lens, and a support arm. The mirror housing contains the front surface mirror and a window. An elevation knob at the back of the mirror housing is used to adjust the vertical angle of the front surface mirror. The support arm houses a pinion gear (which engages the rack on the support post), that is controlled by the focusing knob; it also houses a 14-inch focal length projection lens, which is secured in position by a retaining ring that engages the upper portion of the lens barrel. A lens cap is provided to protect the exposed lens element.

Subparagraph *d*, next to the last line. After "PH-637A/PFP", add: and the PH-637C/PFP.

Subparagraph *e*(1). Delete the heading and substitute:

Aperture plate holder, Projectors PH-637/PFP and PH-637A/PFP, and Projector, Still Picture PH-637B/PFP.

Add subparagraph (1.1) after subparagraph (1):

(1.1) *Aperture masks, Projector, Still Picture PH-637C/PFP.* The PH-637C/PFP has one aperture plateholder which in itself provides the aperture plate for the 9⅝- by 9⅝-inch opening. It also holds any one of the three smaller sized aperture masks between the corner stops provided on the aperture plateholder. The aperture plateholder is mounted by means of the two knurled screws which also mount the projection stage. The aperture plate for the 7¾- by 9⅝-inch opening mounts independently in the same manner as the aperture plateholder described above. It does not contain any facility for holding the other smaller aperture masks.

Page 9, paragraph 5*f*. Delete the heading and substitute: *Carrying Case, Projectors PH-637/PFP and PH-637A/PFP, and Projector. Still Picture PH-637B/PFP.*

Add subparagraph *f.1* after subparagraph *f:*

f.1. Carrying Case, Projector, Still Picture PH-637C/PFP. The carrying case is reinforced with metal corners and has a removable cover that is held in place by four latches (two at the front and two at the back). The carrying case has three handles, one on top of the carrying case cover and one at each end of the carrying case. The bottom section of the carrying case rests on four fixed casters.

Paragraph 6. Make the following changes:

Line 3 (page 5 of C2). Change "PH-637A/PFP and PH-637B/PFP." to: PH-637A/PFP, PH-637B/PFP, and PH-637C/PFP.

Line 7, right-hand column. After "minute", add: (1,600 revolutions per minute, PH-637C/PFP).

Paragraph 8*a*, line 3. Change "(fig. 5)" to: (figs. 5 and 5.1).

Page 10. Add figure 5.1 after figure 5:

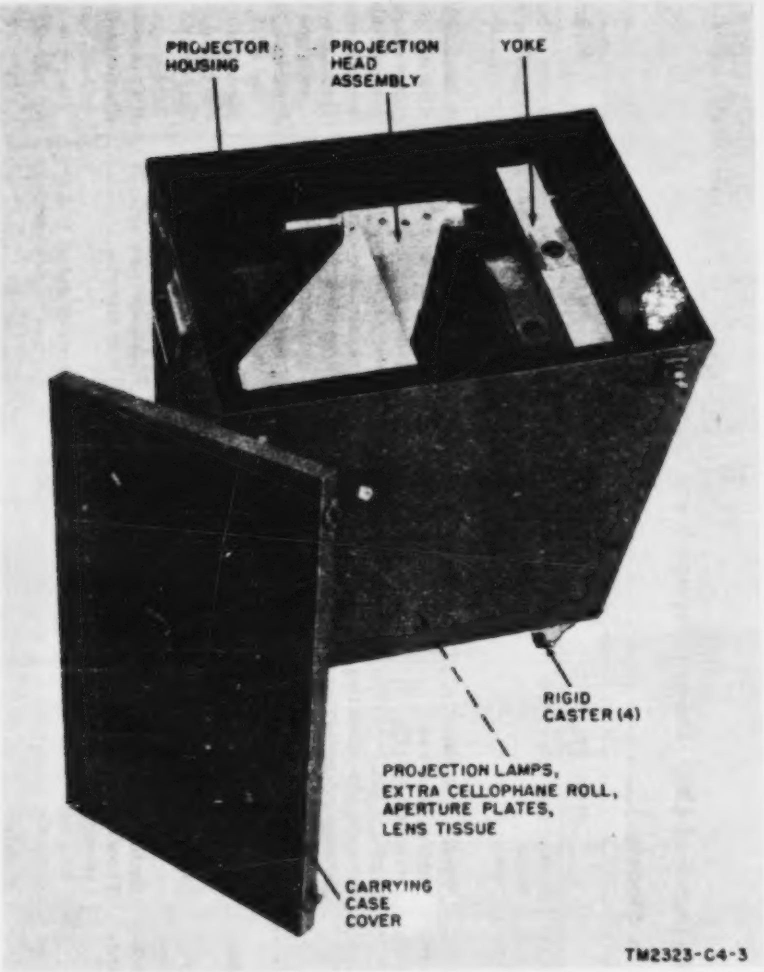
PROJECTOR HOUSING
PROJECTION HEAD ASSEMBLY
YOKE
RIGID CASTER (4)
PROJECTION LAMPS, EXTRA CELLOPHANE ROLL, APERTURE PLATES, LENS TISSUE
CARRYING CASE COVER
TM2323-C4-3

Figure 5.1. Projector PH-637C/PFP, carrying case cover removed.

Paragraph 9 (page 5 of C2). Delete paragraph 9 and substitute:

9. Differences in Models

Item	PH-637/PFP	PH-637A/PFP	PH-637B/PFP	PH-637C/PFP
Housing cover	None	Located at top of housing, rear hinged. (Raises to 45° angle.)	Formed by left shelf	Formed by left shelf.
Projection stage	Fixed	Fixed	Fixed	Raises to 90°.
Aperture plateholder mounting device.	Captive screws on housing.	Captive screws on housing.	Captive screws on holder.	Knurled projection-stage retaining screws at rear of projection stage.
Roll attachment	Separate, side mounting.	Integral, front and rear.	Separate, side mounting	Integral, front and rear.
Power cord	Two-wire, detachable	Two-wire, detachable	Three-wire, attached at projector.	Three-wire, attached at projector.
Shelves	Drop-leaf, front and side.	Drop-leaf, side; front is part of housing cover.	Drop-leaf, front; raised-leaf side.	Drop-leaf, front; raised-leaf side.
Pencil groove location	On front shelf	On housing cover	On housing	Formed when front shelf is raised.
Head-support post mounting location.	Hole in right rear top	Hole in right rear top	Hole in right rear top	Center holes in yoke.
Clamping knob location	Right side, rear	Right side, rear	Right side, rear	Rear of yoke plate.
Projection lens mounting.	Three screws	Three screws	Three screws	Retaining ring.

Page 12, paragraph 10. Make the following changes:

Heading. Change "(figs. 5 and 6)" to: (fig. 5, 5.1, and 6). Subparagraph *b*, line 1. After the first sentence, add: On the PH-637C/PFP, unlatch the four fasteners and lift off the cover.

Page 14, paragraph 11. Make the following changes:

Subparagraph *b* (page 6 of C2). Delete subparagraph *b* and substitute:

b. Open the carrying case and remove the projector housing. Set the housing on the support (*a* above) so that the support post end is away from the projection screen.

Subparagraph *c*, line 1. Change "Loosen the head-support" to: On the PH-637/PFP, PH-637A/PFP, and PH-637B/PFP, loosen the support.

Add subparagraph *c.1* after subparagraph *c:*

c.1. On the PH-637C/PFP, loosen the clamping knob (fig. 7.1) and insert the support post (fig. 2.2) through the hole in the upper locating bracket. The rack should be at the top of the support post, facing toward the projection stage. Slide the support post down until its bottom is engaged in the lower support bracket and the locating pin (on the support post) is engaged in the notches of the upper locating bracket. Secure the support post by tightening the clamping knob (fig. 7.1).

Subparagraph *e*, line 1 and last sentence (page 6 of C2). Change "(PH-637/PFP and PH-637A/PFP)" to: (PH-637/PFP, PH-637A/PFP, and PH-637C/PFP).

Line 8. Change "(fig. 7)" to: (fig. 7 and 7.1).

Page 15. Add figure 7.1 after figure 7:

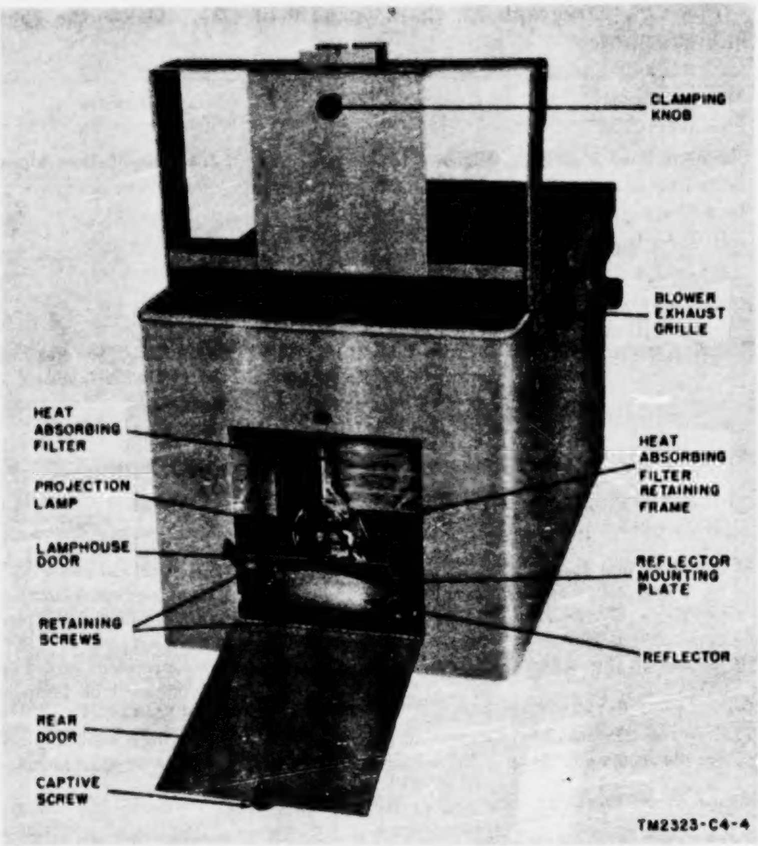
CLAMPING KNOB
BLOWER EXHAUST GRILLE
HEAT ABSORBING FILTER
HEAT ABSORBING FILTER RETAINING FRAME
PROJECTION LAMP
LAMPHOUSE DOOR
REFLECTOR MOUNTING PLATE
RETAINING SCREWS
REFLECTOR
REAR DOOR
CAPTIVE SCREW
TM2323-C4-4

Figure 7.1. Projector, Still Picture PH-637C/PFP, projector housing, rear view, rear door open.

Subparagraph *f*. Delete subparagraph *f* and substitute:

f. For the PH-637/PFP, the PH-637/PFP, and the PH-637C/PFP, raise the shelf at the front of the housing until it snaps into the horizontal position. For the PH-637/PFP and the PH-637A/PFP, raise the shelf on the left side of the housing until the shelf support swings out to hold the shelf in place. On the PH-637B/PFP and the PH-637C/PFP, fold the side shelf down to its extended position.

Subparagraph *h*, note (page 6 of C2). After "PH-637B/PFP", add: or the PH-637C/PFP.

Page 16, paragraph 12, chart (page 6 of C2). Delete the chart and substitute:

Control	Location	Function
Clamping knob	Right side of projector housing, rear of support post (PH-637/PFP, PH-637A/PFP, and PH-637B/PFP) (fig. 27). Rear of yoke plate (PH-637C/PFP) (fig. 7.1).	Locks support post in position.
Focusing knob	On split tube at end of projection head-support arm (PH-637/PFP, PH-637A/PFP, and PH-637B/PFP) (fig. 2). On head-support arm flange (PH-637C/PFP) (fig. 2.2).	Racks projection head up or down for focusing purposes.
Mirror elevation knob (fig. 2 and 2.2).	On back of projection head.	Varies vertical angle of front surface mirror; moves image up or down on screen.
On-off switch (fig. 2 and 2.2).	On front of housing	Turns projector power on or off; controls lamp and blower.
Takeup roll winding device (fig. 1, 2, and 2.2).	On rear of housing (PH-637A/PFP and PH-637C/PFP); on left side of housing (PH-637/PFP and PH-637 B/PFP).	Winds used cellophane or plastic on takeup roll.
Supply roll winding device (fig. 2 and 2.2).	On front of housing (PH-637A/PFP and PH-637C/PFP; on right side of housing (PH-637/PFP and PH-637B/PFP).	Rewinds cellophane or plastic back on supply roll.

Page 19, paragraph 16*a* (page 6 of C2). Make the following changes: Line 2. After "PH-637A/PFP", add: and the PH-637C/PFP.

Add subparagraph (3) after subparagraph (2):

(3) *PH-637C/PFP*. Raise the front shelf (fig. 2.2) and make sure that the projection stage is all the way down. Hold the

supply roll so that the leading edge of the cellophane or plastic faces away from the housing and feeds from the bottom of the roll. Engage the left slot of the roll with the left pivot. Pull the right supply roll knob out, and slide the right side of the roll in until the slot engages with the pivot. Grasp the leading edge of the cellophane or plastic and feed it through the slot formed by the rear of the front shelf and the front of the projection stage; pull it up and over the projection stage to the takeup roll in the rear of the housing. Lay the leading edge of the cellophane or plastic over the top of the takeup roll and attach with tape. When the takeup knob is turned clockwise, the cellophane or plastic is wound on the takeup roll.

Page 41, paragraph 38. Delete paragraph 38 and substitute:

38. Rust and Corrosion

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TM 9-213.

Figure 22. Delete figure 22.

Page 42, figure 23. Delete figure 23.

Figure 23.1 (page 2 of C1). Make the following changes: Caption. After "*lubrication points*" add: (*PH-637/PFP, PH-637A/PFP, and PH-637B/PFP*).

Add the following note below the figure:

Note On the PH-637C/PFP, the oil cups are located on top of the motor.

Page 43, paragraph 39*c* (page 1 of C1, page 7 of C2). Delete subparagraph *c* and substitute:

c. Blower Motor. Lubricate the blower motor semiannually, as instructed below.

Note Equipment procured on Order No. AF33(600)23384 does not require blower motor lubrication.

(1) Remove the projection head assembly by racking the projection head up off the support post, and set it carefully to one side.

(2) Carefully lay the housing on its side, on a level working space.

(3) On the PH-637/PFP and the PH-637A/PFP, remove the bottom cover (par. 55*e*(4)). On the PH-637B/PFP, remove the six bottom cover mounting screws (fig. 29.1) that secure the bottom cover, and lift off the bottom cover to reach

the blower motor. On the PH-637C/PFP, remove the bottom cover and blower assembly (fig. 29.3, and par. 55*g*).

(4) Apply two or three drops of Lubricating Oil, General Purpose (LO), Spec VVL-820, to each oil cup (fig. 23.1).

(5) Install the bottom cover and secure it with the bottom cover mounting screws removed in the procedure given in (3) above.

Page 45, paragraph 47, chart (page 7 of C2). Make the following changes: "Item" column, line 3. Change "(PH-637/PFP and PH-637B/PFP)" to: (PH-637/PFP, PH-637B/PFP, and PH-637C/PFP). "Corrective measures" column, lines 4 through 8. Delete lines 4 through 8 and substitute: If the left-hand shelf (PH-637/PFP or PH-637A/PFP) does not stay in position, raise it and manually pull out the shelf support. If the front shelf (PH-637/PFP, PH-637B/PFP, or PH-637C/PFP) does not stay open, raise it until it snaps into the locked position.

Page 48, paragraph 51. Make the following changes: Subparagraph *a* (page 7 of C2). Add after the second sentence: On the PH-637C/PFP, the heat-absorbing filter (fig. 7.1) is located between the projection lamp and the glass condenser lens.

Subparagraph *b* (page 7 of C2). After the last sentence, add: In the PH-637C/PFP, the air from the two blowers is divided into two streams, one of which is directed to the lamp and one to the heat-absorbing filter.

Subparagraph *c*, line 4 (page 7 of C2). Change "requires" to: and the PH-637C/PFP require.

Figure 25, note (page 8 of C2). Delete the note and substitute:

Note. The power cable on the PH-637B/PFP and on the PH-637C/PFP is attached to the equipment at one end and has a male plug connector (including a ground pin) on the free end.

Page 49, paragraph 51*d*, line 7. After "into the back", add: On Projector, Still Picture PH-637C/PFP, the supply unit is built into the front of the housing, below the front shelf; the takeup unit is built into the top of the housing, immediately back of the projection stage.

Page 51, paragraph 55, heading. Add after "Housing": (PH-637/PFP, PH-637A/PFP, and PH-637B/PFP).

Page 56 (page 12 of C2). Add figure 29.3 after figure 29.2.

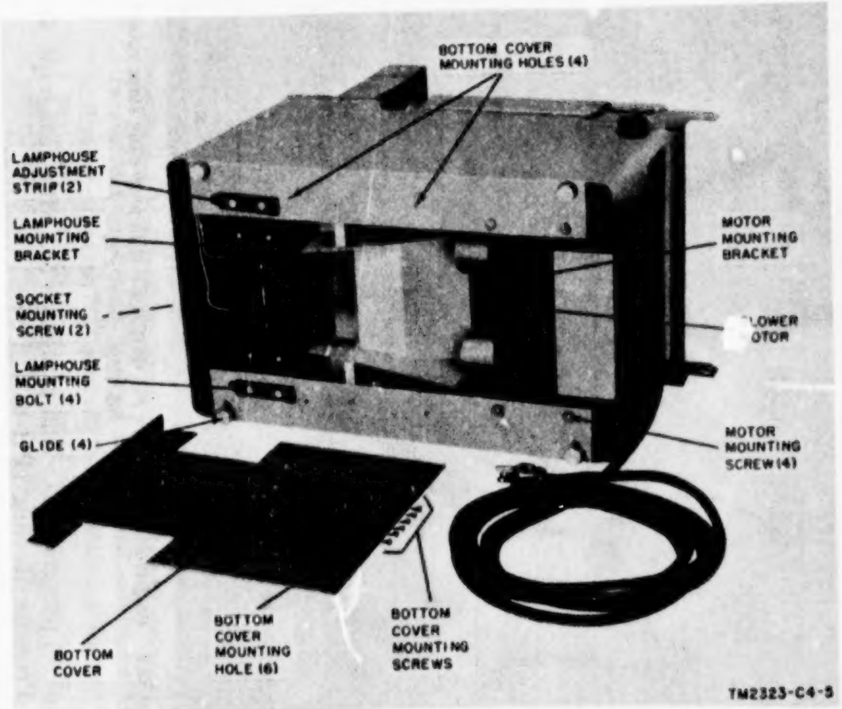
BOTTOM COVER MOUNTING HOLES (4)
LAMPHOUSE ADJUSTMENT STRIP (2)
LAMPHOUSE MOUNTING BRACKET
SOCKET MOUNTING SCREW (2)
LAMPHOUSE MOUNTING BOLT (4)
GLIDE (4)
BOTTOM COVER
BOTTOM COVER MOUNTING HOLE (6)
BOTTOM COVER MOUNTING SCREWS
MOTOR MOUNTING BRACKET
LOWER OTOR
MOTOR MOUNTING SCREW (4)
TM2323-C4-5

Figure 29.3. Projector, Still Picture PH–637C/PFP with bottom cover removed.

~~Page 59~~ (page 13 of C2). Add figure 32.2 after figure 32.1.

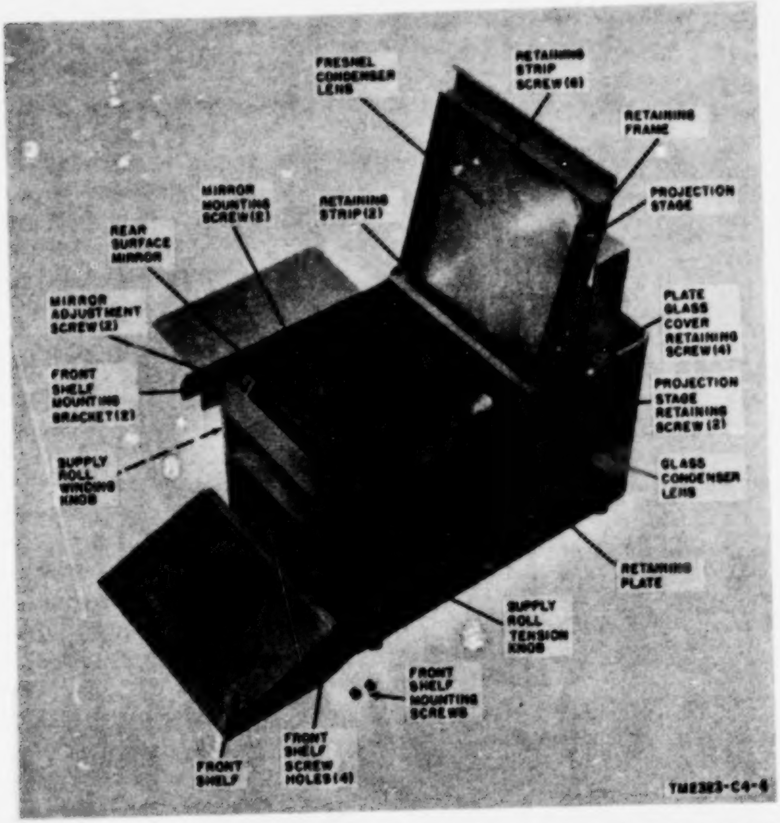
FRESNEL CONDENSER LENS
RETAINING STRIP SCREW(6)
RETAINING FRAME
PROJECTION STAGE
MIRROR MOUNTING SCREW(2)
RETAINING STRIP(2)
REAR SURFACE MIRROR
MIRROR ADJUSTMENT SCREW(2)
PLATE GLASS COVER RETAINING SCREW(4)
FRONT SHELF MOUNTING BRACKET(2)
PROJECTION STAGE RETAINING SCREW (2)
SUPPLY ROLL WINDING KNOB
GLASS CONDENSER LENS
RETAINING PLATE
SUPPLY ROLL TENSION KNOB
FRONT SHELF MOUNTING SCREWS
FRONT SHELF
FRONT SHELF SCREW HOLES(4)
TM2323-C4-6

Figure 32.2. Projector, Still Picture PH–637C/PFP with projection stage raised, top view.

Page 60, paragraph 55. Add paragraph 55.1 after paragraph 55:

55.1. Projector Housing (PH–637C/PFP)

a. Shelves and Glide.

(1) To remove the front shelf (fig. 32.2), remove the two front shelf mounting screws, locating washers, and nuts from each side of the front shelf; slide the front shelf forward until it slips off the front shelf mounting brackets.

(2) To reinstall the front shelf, place it over the front shelf mounting brackets so that the holes line up. Put the locating

washers on the screws and insert the screws in the aligned holes. The locating washers are centered in the oversized holes on the shelf directly under the screwheads, so that the underneath surfaces of the screwheads are flush with the outside of the shelf. Install and tighten the nuts.

(3) The left shelf is permanently attached and cannot be removed.

(4) The glides (fig. 29.3) are screwed into the housing and can be removed by turning them counterclockwise.

b. *Projection Stage.*

(1) Remove the projection-stage retaining screws (fig. 2.2) at the rear of the projection stage.

(2) Carefully lift off the projection stage and place it on a level surface.

(3) Remove the four screws, mounting clips, lockwashers, and hexagonal nuts that secure the plate glass cover to the top of the projection stage. (To do this, hold the lockwashers and nuts underneath the projection stage with one hand while using a screwdriver with the other hand to unscrew the screws.)

(4) Carefully lift off the plate glass cover and place it on a clean, smooth, flat surface.

(5) Turn the projection stage (fig. 32.2) over so that the convex side of the Fresnel condenser lens is facing up.

(6) Remove the six screws and strap nuts that hold the retaining strips (front and rear) in place.

(7) Lift off the retaining strips and lay them aside.

(8) Remove the Fresnel condenser lens and its retaining frame.

(9) Carefully remove the Fresnel condenser lens by gently sliding it out of the grooves of the retaining frame.

(10) To reassemble the projection stage, first slide the Fresnel condenser lens into the grooves of its retaining frame; be careful not to scratch or bend the Fresnel condenser lens, and make sure that it is centered in the retaining frame.

(11) Place the retaining frame firmly over the opening in the projection stage so that the frame is centered between the four holes used to mount the plate glass.

(12) Reinstall the retaining strips on the front and rear edges of the Fresnel condenser lens so that the holes in the retaining strips line up with the holes in the projection stage.

(13) Reinstall the screws and strap nuts (that secure the retaining strips) while exerting gentle downward pressure on the retaining strips.

Head-support post locating devices.	Notches in head-support post on pin in housing.	Notches in head-support post on pin in housing.	Notches in head-support post on pin in housing.	Pin through head-support post into notches on upper locating bracket on yoke.
Projection lamps	500-watt, one supplied	1,000-watt, five supplied.	1,000-watt, five supplied.	1,000-watt, five supplied.
Support post locating plug and locking screw.	Hexagonal-head, access through side door.	Allen-head, on right side of housing, below support post clamping knob.	Allen-head, on right side of housing, below support post clamping knob.	None.
Cooling air ducts	None	Attached to bottom cover with clips.	Attached to bottom cover with screws.	Internally riveted to housing; not removable.
Blowers	Single, 3,050 rpm	Single, 3,050 rpm	Double, 3,050 rpm	Double, 1,600 rpm.
Glides	Fixed	Fixed	Fixed	Leveling type.
Projector stand	None	Some procurements	None	None.
Rear surface mirror adjusting screws, access.	Remove front shelf	Raise housing cover	External at either side of housing.	Raise projection stage.
Glass condenser lens, access.	Through side door	Through side door	Through side door	Through projection stage.
Heat-absorbing filter, access.	None	None	Through side door	Through rear door.
Fresnel condenser lens, access.	Removal of plate glass on top of housing.	Raising of housing cover, removal of plate glass cover.	Removal of plate glass cover on top of housing.	Raising of projection stage.

(14) Make sure that the retaining frame is firmly seated in the projection stage and that it is centered between the four holes used in mounting the plate glass cover.

(15) Turn the projection stage over.

(16) Reinstall the mounting clips, screws, and lockwashers (removed in (3) above); loosely attach the assembled parts with their associated nuts.

(17) Gently insert the plate glass cover under the four loose mounting clips.

(18) Being careful not to crack or chip the plate glass cover, hold the nuts under the projection stage with the fingers of one hand and tighten each of the screws in the mounting clips with a screwdriver.

(19) Place the projection stage on the housing; align the holes on the rear of the projection stage with the holes on the rear of the housing.

(20) Insert the projection-stage retaining screws through the holes in the projection stage until they engage the threaded bushings on the housing.

(21) Handtighten the projection-stage retaining screws to hold the projection stage firmly in place.

c. Reflector. Open the rear door of the projector (fig. 7.1). Remove the upper left retaining screw from the reflector mounting plate. Carefully hold the reflector with one hand and unscrew the lower right retaining screw. Lift the reflector mounting plate out of the housing. The reflector is not removable from the reflector mounting plate because the reflector retaining clips are riveted to the reflector mounting plate. To reassemble the reflector mounting plate, perform the above procedure in reverse order.

Note. Whenever the reflector mounting plate has been removed and reinstalled, the reflector must be realigned (par. 59*e*).

d. Glass Condenser (fig. 32.2).

(1) Raise the projection stage all the way.

(2) Support the glass condenser lens with one hand and, with the other hand, use a screwdriver to remove the four screws on the retaining plate.

(3) Gently lift out the glass condenser lens and the retaining plate.

Note. The glass condenser lens has a frosted spot in the center of the convex side to promote better light distribution.

(4) Carefully separate the glass condenser lens from the retaining plate.

(5) To reinstall the glass condenser lens, perform the procedures in (1) through (4) above in reverse order.

Note. When the glass condenser lens or its mounting is disturbed, optical alignment (par. 59) of the projector must be checked.

e. *Lamphouse Assembly.*

(1) Loosen the captive screw at the top center of the rear door; open the rear door (fig. 7.1) of the projector housing.

(2) Raise the latch above the lamphouse door, and open the lamphouse door.

(3) Remove the projection lamp from the socket by turning it counterclockwise.

(4) Raise the latch at the top of the heat-asorbing filter and gently lift the heat-asorbing filter up and out of the retaining strip at the bottom of the heat-absorbing filter retaining frame.

(5) Close the lamphouse door.

(6) Rack the projection head up and off the support post, and set it carefully to one side.

(7) Carefully lay the projector housing on its side on a level working surface.

(8) Remove the bottom cover mounting screws (fig. 29.3) and take off the bottom cover.

(9) Hold the double strap nut (on top of the lamphouse mounting bracket) with the fingers of one hand, and remove the two lower lamphouse mounting bolts at the bottom of the lamphouse assembly with the other hand.

Note. Whenever the four lamphouse mounting bolts have been loosened, alignment of the projection lamp with reference to the glass condenser lens must be rechecked (par. 59*f*).

(10) Lift out the double strap nut and lay it to one side, along with the lamphouse adjustment strip.

(11) Loosen the two upper lamphouse mounting bolts until they can be turned with the fingers.

***Caution:* Remove the two upper lamphouse mounting bolts and the lamphouse adjustment strip.**

(12) With the fingers of one hand, hold the upper double strap nut firmly so that the lamphouse assembly will be supported when the lamphouse mounting bolts are removed. Grasp the bottom of the lamphouse assembly firmly with one hand and slide out the upper double strap nut with the other hand.

(13) With one hand, move the lamphouse assembly all the way to

the rear of the projector housing and slide it up as far as it will go.

(14) Swing out the bottom of the lamphouse assembly until the lamphouse mounting bracket is outside the projector housing.

(15) Slide the lamphouse assembly downward until the upper portion of its mounting bracket clears the bottom of the projector housing.

(16) Remove the lamphouse assembly by drawing it straight out and turning it to the left.

(17) To reassemble the lamphouse assembly, perform the procedures in (1) through (13) above in reverse order.

f. Lamp Socket (fig. 29.3).

(1) Remove the lamphouse assembly (*e*(1) through (13) above).

(2) Carefully lay the lamphouse assembly on its side with the heat-absorbing filter facing the bottom of the projector housing. The lamphouse mounting bracket will be on the right.

(3) Tag and disconnect the wires leading from the lamphouse assembly by twisting the associated wire nuts in a counterclockwise direction.

(4) Turn the lamphouse assembly so that the two socket mounting screws can be seen through the central hole in the bottom of the lamphouse mounting bracket.

(5) Loosen the two socket mounting screws.

(6) Open the lamphouse door and remove the two socket mounting screws and the lamp socket.

(7) Pull the lamp socket out through the lamphouse door opening, with the wires attached.

(8) Turn the lamp socket upside down and gently pry out the fiberboard washer that covers the screw terminals of the socket. The wire terminations can be removed by unscrewing the screw terminals.

***Caution:* When replacing the lamp socket, make sure that the wide slot on the top of the lamp socket faces the heat-absorbing filter, and the narrow slot faces the reflector.**

(9) To reassemble the lamphouse assembly, perform the procedures given in (1) through (8) above in reverse order.

g. Blower Motor and Fans (fig. 29.3).

(1) Perform the procedures given in *e* (2), (3), and (4) above.

(2) Remove the blower motor by removing the four motor mounting screws and nuts that secure the motor mounting brackets to the bottom of the projector housing.

(3) Carefully lift the blower motor out of the projector housing.

(4) To remove either fan, use an Allen wrench to loosen the setscrew that holds the fan in place on the motor shaft; then slide the fan from the shaft.

***Caution:* Be sure to reinstall the blower motor in the projector housing so that the blower nozzles face the projection lamp. To reassemble the blower motor and fans, perform the procedures given in (1) through (4) above in reverse order.**

h. Power Switch.

(1) Perform the procedures given in *e* (2), (3), and (4) above.

(2) Remove the two power switch screws (fig. 2.2) that secure the on-off switch on the front of the projector housing.

(3) Withdraw the switch from the housing as far as the attached leads will permit; unscrew the two terminal screws from the switch and remove the leads.

(4) To reinstall the power switch, perform the procedures given in (1), (2), and (3) above in reverse order.

i. Rear Surface Mirror (fig. 32.2).

(1) Raise the projection stage all the way.

(2) Remove the two mirror adjustment screws and washers.

(3) Carefully remove the two mirror mounting screws on each side at the mirror axis, and lift the rear surface mirror out.

(4) To reinstall the rear surface mirror, perform the procedures in (1), (2), and (3) above in reverse order.

Note. Whenever the rear surface mirror is removed and reinstalled, it must be realigned (par. 59).

k. Roll Attachment Winding Knobs.

(1) To disassemble either the takeup roll or the supply roll winding knob (fig. 2.2) and its pivot, remove the setscrew in the takeup roll or supply roll winding knob with a No. 8 Allen wrench, slide the pivot out of the permanently attached sleeve bushing, and catch the takeup roll or supply roll winding knob as it falls free.

(2) To disassemble either the takeup roll or the supply roll tension knob (fig. 32.2) and pivot, depress the tension pivot against the side of the projector housing. Loosen the Allen-head screw on the takeup roll or supply roll tension knob, and remove the takeup roll or supply roll tension knob. Release pressure on the tension pivot. The pivot, washer, and spring can then be removed from the sleeve bushing.

(3) To reinstall the knobs and pivots, perform the procedures above in reverse order.

Paragraph 56, heading. After "Assembly" add: (PH-637/PFP, PH-637A/PFP, and PH-637B/PFP).

Page 61, paragraph 56. Add paragraph 56.1 after paragraph 56.

56.1. Projection-Head Assembly (PH-637C/PFP)

(fig. 2.2)

a. Window. Remove the two window frame mounting screws that secure the left side of the window frame to the mirror housing. Hold the window frame in place and remove the two window frame mounting screws on the right side of the mirror housing. Carefully lift the window and window frame off the mirror housing. To reinstall the window and window frame, carefully place the window in the window frame, set the assembled window frame back on the mirror housing, and install the four window frame mounting screws.

b. Front Surface Mirror and Mirror Support.

(1) Remove the window (*a* above).

Caution: **Handle the front surface mirror carefully. The reflecting surface of the mirror is coated, and the coating is not protected. Clean the front surface mirror only when absolutely necessary. Whenever handling the front surface mirror, hold a chamois or a clean, lint-free cloth between the hand and the mirror so that the front surface mirror will not be spotted.**

(2) Turn the elevation knob on the back of the projection head counterclockwise until it comes off. Support the front surface mirror with one hand.

(3) Remove the two screws on the back of the projection head. The front surface mirror and the mirror support will drop free; carefully lift them out of the projection head and place them on a flat surface.

(4) Remove the two screws from the retaining clip that supports the bottom of the front surface mirror.

(5) Remove the retaining clip and slide the mirror out.

(6) To reassemble the front surface mirror and mirror support, perform the procedures in (1) through (5) above in reverse order.

Note. When installing the elevation knob, be sure that it is threaded far enough into the back of the mirror support so that the projected image will be approximately centered.

c. Lens.

***Caution:* Be sure that the lens is always well supported while it is being removed. If it should drop, the projection-stage plate glass, the Fresnel condenser lens, and possibly the rear surface mirror would be broken, and the projection lens might be damaged permanently.**

(1) Remove the window (*a* above).

(2) Remove the mirror housing by removing the three screws, lockwashers, and nuts on the underside of the support arm. Lift off the mirror housing and lay it to one side.

(3) Support the lens with one hand. With a spanner wrench, remove the projection lens by unscrewing the retaining ring on top of the support arm. When the projection lens retaining ring is free, lift it off and lower the lens through the hole in the support arm.

(4) To reinstall the projection lens, perform the procedures given in (1), (2), and (3) above in reverse order.

d. Support Arm.

(1) Remove the projection head assembly by racking it up off the support post.

(2) Remove the projection lens (*c* above).

(3) To reassemble the projection head, perform the procedures given in (1) and (2) above in reverse order.

e. Elevation Knob and Focusing Knob. To remove the elevation knob, loosen the Allen-head setscrew and slide the elevation knob off the threaded stud. The focusing knob is attached to the pinion shaft with a roll pin and cannot be removed.

Page 63, paragraph 58*b*. Add after the last sentence: On the PH-637C/PFP, loosen the two hexagonal-head bolts on the upper locating bracket of the yoke (fig. 1.1), and move the support arm from side to side until the top and bottom edges of the image are horizontal; then tighten the hexagonal-head bolts.

Paragraph 59*d*(1) (page 14 of C2), second sentence. Add after the second sentence: On the PH-637C/PFP, loosen the two hexagonal-head bolts on the upper locating bracket of the yoke.

Page 64, paragraph 59*d*(2) (page 14 of C2), second sentence. Add after the second sentence: On the PH-637C/PFP, raise the projection stage all the way.

Paragraph 59*f*(3) (page 14 of C2), last sentence. Change "PH-637B/PFP" to: PH-637B/PFP and the PH-637C/PFP.

Page 65, paragraph 59*f*(3)(*d*) (page 14 of C2), line 1. Delete "For the PH-637B/PFP, grasp."

Line 3. Change "(fig. 29.1)" to: (fig. 29.1 and 29.3).

Paragraph 61*d*, last sentence. After the last sentence, add: On the PH-637C/PFP, the roll pin which runs through the head-support post should sit firmly in the notches of the upper locating bracket of the yoke.

Page 69, appendix I (page 1 of C3). Under the heading "5. Other Publications", make the following changes:

Delete the second item and its title, and substitute

DA Pamphlet 310-4	Index of Technical Manuals, Technical Bulletins, Lubrication Orders, and Modification Work Orders.

Add the following:

TM 38-750	The Army Equipment Record System and Procedures.

Delete paragraph 8 in appendix I.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
CofEngrs (1)
TSG (1)
CSigO (7)
CofT (1)
USA CD Agcy (1)
USCONARC (5)
USAMC (5)
USAECOM (5)
USAMICOM (4)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
MDW (1)
Armies (2)
Corps (2)
USA Corps (3)
Instl (2) except Ft Monmouth (63)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
USASTC (2)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Sig Dep (OS) (12)
Army Dep (2) except
  Ft Worth (8)
  Lexington (12)
  Sacramento (17)
  Tobyhanna (12)
Sig Sec, GENDEP (OS) (5)
USA Elct RD Actv (Ft Huachuca) (2)
USA Elct RD Actv (White Sands) (13)
WRAMC (1)
Army Pic Cen (2)
USA Mbl Spt Cen (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
USAOSA (1)
AFIP (1)
AMS (1)
USA Elct Mat Agcy (25)
Chicago Proc Dist (1)
USASSC (4)
USARCARIB Sig Agcy (1)
Sig Fld Maint Shops (3)
JBUSMC (2)
Units organized under following TOE's (2 copies each unless otherwise indicated):
  9-377
  11-7
  11-16
  11-57
  11-96
  11-117
  11-155
  11-157
  11-500 (AA-AC) (4)
  11-557
  11-587
  11-592
  11-597
  19-256
  19-316
  44-16
  44-102
  44-112

NG: State AG (3); units—same as active Army except allowance is one copy each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

Changes in force: C 2, C 3, C 4, and C 5

TM 11-2323
*C 5

TECHNICAL MANUAL

PROJECTORS PH-637/PFP AND PH-637A/PFP, AND PROJECTORS, STILL PICTURE PH-637B/PFP AND PH-637C/PFP

TM 11-2323 CHANGE NO. 5	HEADQUARTERS, DEPARTMENT OF THE ARMY WASHINGTON, D.C., *9 September 1963*

TM 11-2323, 7 April 1954, is changed as follows:

Note. The parenthetical reference to previous changes (example: "page 14 of C 4") indicates that pertinent material was published in that change.

Page 12, paragraph 10. Make the following changes: Delete subparagraph *b* (Page 14 of C 4) and substitute:

b. On the PH-637/PFP, PH-637A/PFP, and PH-637B/PFP, open the carrying case by unlatching the two fasteners. On the PH-637C/PFP, unlatch the four fasteners, and lift off the cover.

Add subparagraph *c* after subparagraph *b*.

c. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (appx III). Report all discrepancies in accordance with TM 38-750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent the use of the equipment.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S PREVENTIVE MAINTENANCE

35. Scope of Maintenance

The maintenance duties assigned to the operator of Projector PH-637(*)/PFP are listed below with references to the paragraphs covering the specific maintenance functions. The duties assigned do not require tools or test equipment other than those issued with the equipment.

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*This change supersedes C 1, 14 April 1959.

a. Daily preventive maintenance checks and services (par. 39).

b. Weekly preventive maintenance checks and services (par. 40).

c. Cleaning (par. 41).

d. Troubleshooting (par. 42).

36. Materials Required for Maintenance

a. Cleaning compound (FSN 7930-395-9542).

b. Lens cleaner (FSN 6750-408-5175).

c. Lens tissue (FSN 6640-393-2090).

d. Textile cloth (FSN 8305-267-3015).

37. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 39, 40, and 41 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (pars. 39 and 40) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining serviceability, the charts indicate what to check, how to check, and what the normal conditions are. The *References* column lists the paragraphs that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

38. Preventive Maintenance Checks and Services Periods

Paragraph 39 specifies checks and services that must be accomplished daily. Paragraph 40 specifies *additional* checks and services that must be performed *once* each week.

39. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the equipment is complete (appx III).	
2	Exterior surfaces	Clean the metal surfaces, projection head assembly window (fig. 3), plate glass cover (fig. 2, 2.2, and 26.1) and projection lens (para. 41).	
3	Shelves	Raise front shelf (fig. 2.2, 26, and 26.1) of projector (PH-637/PFP, PH-637B/PFP, PH-637C/PFP); raise left-hand shelf of projector.	Par. 42*a*.
4	Power cable	Connect power cable (on PH-637/PFP and PH-637A/PFP) to projector, then to power source (para 11*h*).	Par. 42*b*.
5	Starting	Remove lens cap, and operate on-off switch (fig. 2, 2.2, and 26.1) to ON.	Par. 42*c*.
6	Focusing	Place transparency flat on on projection stage, and focus image on screen by adjusting focusing knob.	
7	Centering	Tighten support post locking knob (fig. 27). Center image on screen by moving projector (for horizontal centering) and adjusting mirror elevation knob (fig. 2, 2.1 and 2.2) (for vertical centering).	
8	Projection head assembly.	Attempt to rotate projection head assembly to left and to right; projection head assembly should not rotate.	
9	Lopsided image	Check image on screen for horizontal and parallel top and bottom edges.	
10	Stopping	Operate on-off switch to OFF.	

40. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure
1	Projector interior.	*Caution:* Be careful not to scratch or crack mirrors or lenses. *a.* Open rear and lamp house doors (par. 11c; figs. 7 and 7.1). Remove and clean (par. 41) projection lamp. Clean reflector surface (fig. 28) and rear surface of condenser lens (fig. 29), except on PH-637C/PFP. Replace projection lamp, and close rear and lamp house doors. *b.* Open door on left side of projector (fig. 2), except on PH-637C/PFP. Raise projection stage on PH-637C/PFP (fig. 32.2). Clean rear surface mirror (fig. 24), front surface of condenser lens, and bottom of Fresnel condenser lens (par. 41). Close door, or lower projection stage.

41. Cleaning.

Inspect the metal surfaces of the projector. The metal surfaces should be free from dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

***Warning:* Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. *Do not* use near a flame.**

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with cleaning compound.

***Caution:* Be careful not to scratch or crack the mirrors and lenses during cleaning.**

c. Wipe the projection head window and projection stage plate-glass cover with a clean, damp cloth.

d. Wipe fingerprints from the projection lens, reflector, condenser lens, rear surface mirror, and Fresnel condenser lens with a lens tissue dampened with lens cleaner.

e. Clean the projection lamp with a clean, soft cloth.

42. Operator's Troubleshooting

If an abnormal condition is observed during the operator's preventive maintenance check (par. 39), perform the applicable checks and corrective measures (*a*, *b*, and *c* below). If the trouble is not corrected by these corrective measures, higher echelon repair is required.

a. If the front shelf (PH–637/PFP, PH–637B/PFP, and PH–637C/PFP) does not stay open, raise it until it snaps into the locked position. If the left-hand shelf (PH–637/PFP or PH–637A/PFP) does not stay in position, raise it, and manually pull out the shelf support.

b. If the female power cable connector does not fit the power cable receptacle on the front of the projector housing (on PH/637/PFP and PH–637A/PFP), check the power cable receptacle. Straighten bent prongs.

c. If the blower motor operates, and the projection lamp does not light, open the rear and lamp house doors (figs. 7.1 and 24), and check the projection lamp for secure mounting in its socket. If the lamp is securely mounted in its socket, replace the lamp.

Section II. ORGANIZATIONAL MAINTENANCE

43. Scope of Organizational Maintenance

a. This section contains instructions covering second echelon maintenance of Projector PH–637(*)/PFP. It includes instructions for performing preventive and periodic maintenance services and repair functions to be accomplished by the organizational repairman.

b. Second echelon maintenance of Projector PH–637(*)/PFP includes:

(1) Preventive Maintenance (par. 46 and 47).
(2) Lubrication (par. 47.1).
(3) Troubleshooting (pars. 47.2 and 47.3).

44. Tools, Materials, and Test Equipment Required

a. *Tools*. Tool Kit, Photographic Repair TK–77/GF.

b. *Materials*.

(1) Cleaning compound, FSN 7930–395–9542.
(2) Lubricating Oil, General Purpose (LO) (FSN 9150–252–6173).
(3) Lubricating oil, general purpose: preservative (PL-special), (FSN 9150–273–2389).

c. *Test Equipment*. Multimeter AN/URM–105.

45. Organizational Preventive Maintenance

a. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of Projector PH–637(*)/PFP are made at a monthly interval at the same time that the daily (par. 39) and weekly (par. 40) checks and services are made, unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38–750.

46. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (par. 47) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance. Equipment in limited storage (requires service before operation) does not require monthly maintenance. All deficiencies and shortcomings will be recorded in accordance with the requirements of TM 38-750.

47. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Installation	See that the euipment is properly installed (par. 11).	
2	Preservation ...	*a.* Check all painted surfaces to be sure that they are free of bare spots, rust, and corrosion.	*a.* None.
		b. Remove rust and corrosion by lightly sanding them with fine sandpaper. Brush two thin coats of paint on	*b.* TM 9–213.

47. Monthly Preventive Maintenance Checks and Services Chart—(Continued)

Sequence No.	Item	Procedure	References
		bare metal to protect it from further corrosion.	
3	Publications	See that all publications are complete, serviceable, and current. (DA Pam 310–4).	
4	Modifications ...	Check DA Pam 310–4 to determine whether new MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	
5	Lubrication	Lubricate the equipment (par. 47.1).	
6	Reflector and lenses.	*a.* Check projection stage plate glass and Fresnel condenser lens for cracks.	*a.* Pars. 55*b* and 55.1*b*.
		b. Check reflector and condenser lens for scratches and breakage.	*b.* Pars. 55*c* and *d* and 55.1*c* and *d*.
		c. Check rear surface mirror for scratches and cracks.	*c.* Pars. 55*i* and 55.1*i*.
		d. Check projection head assembly window, front surface mirror, and projection lens (figs. 2, 2.1, and 2.2) for scratches and cracks.	*d.* Pars. 56*a*, *b*, and *c* and 56.1*a*, *b*, and *c*.
7	Lamp socket ...	Check lamp socket for corrosion and damage.	Pars. 55*e* and 55.1*f*.
8	Knobs	Check mirror elevation knob (fig. 2, 2.1, and 2.2) focusing knob, and support post locking (clamping) knob (fig. 7.1 and 27) for looseness and cracks.	Pars. 55*k*, 56*e*, and 56.1*e*.
9	Spare parts	Check operator and organizational spare parts for general condition and method of storage. There should be no overstock-	Appx III and TM 11–6730–207–20P.

47. Monthly Preventive Maintenance Checks and Services Chart—(Continued)

Sequence No.	Item	Procedure	References
		age, and all shortages must be on valid requisitions.	

47.1. Lubrication

Lubrication of the support post (*a* below) is required monthly, and lubrication of the blower motor (*b* below) is required semiannually. A month consists of 30 days of normal 8-hour operation. If the equipment is operated more than 8 hours a day, the lubrication intervals should be adjusted accordingly. For example, if the equipment is operated 16 hours a day, the support post should be lubricated at 15-day intervals instead of monthly.

a. Support Post. Lubricate the support post (figs. 2 and 2.2) as follows:

(1) Remove the head support arm from the support post.

(2) Moisten a clean cloth with lubricating oil (PL-SPECIAL).

(3) Wipe the support arm with the moistened cloth, and remove all dirt and grit.

(4) Replace the head support arm on the support post.

b. Blower Motor. Lubricate the blower motor as follows:

Note. Equipment procured on Order No. AF33 (600) 23384 does not require lubrication of the blower motor.

(1) Remove the projection head assembly from the support post; set the projection head assembly carefully to one side.

(2) Carefully lay the housing (figs. 1.1 and 3) on its side.

(3) On the PH–637/PFP and the PH–637A/PFP, remove the bottom cover (par. 55*e*(4)). On the PH–637B/PFP, remove the six bottom cover mounting screws (fig. 29.1) that secure the bottom cover, and lift off the bottom cover to reach the blower motor. On the PH–637C/PFP, remove the bottom cover (fig. 29.3) and blower assembly (par. 55.1*g*).

(4) Apply 2 or 3 drops of lubricating oil (LO) to each oilcup (fig. 23.1). On the PH-637C/PFP, the oilcups are located on top of the motor.

(5) Install the bottom cover, and secure it with the bottom cover mounting screws removed in (3) above.

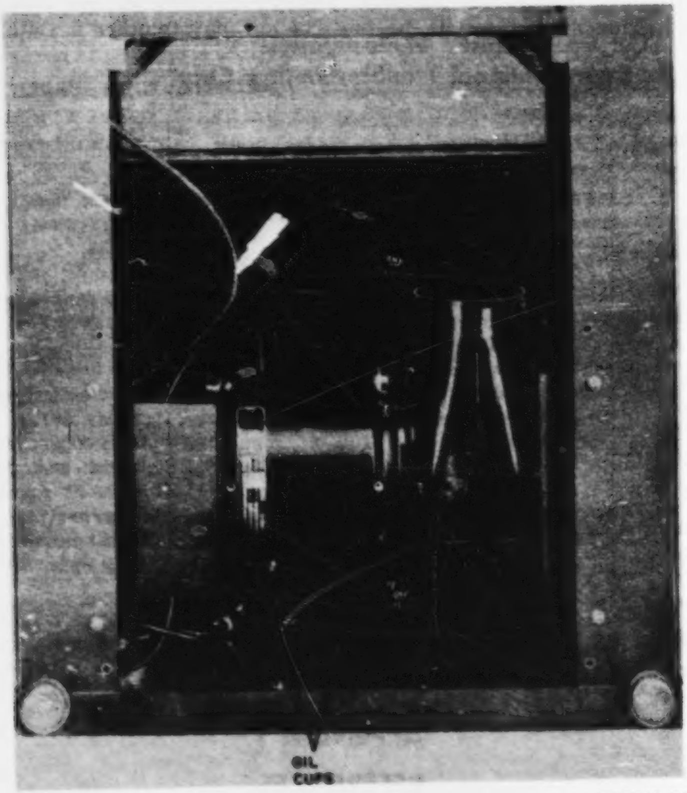

Figure 23.1. Blower motor, lubrication points (PH-637A/PFP, and PH-637B/PFP).

47.2. Organizational Troubleshooting

Organizational troubleshooting of this equipment is based upon the operational check contained in the daily preventive maintenance checks and services chart (par. 39). To troubleshoot the equipment, perform all functions starting with sequence No. 4

in the daily preventive maintenance checks and services chart, and proceed through the items until an abnormal condition or result is observed. When an abnormal condition or result is observed, note the sequence number, and turn to the corresponding item number in the troubleshooting chart (par. 47.3). Perform the checks and corrective measures indicated in the troubleshooting chart. If the corrective measures indicated do not result in correction of the trouble, higher echelon maintenance is required.

47.3. Organizational Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
4	Power cable connector does not fit power cable receptacle (fig. 2).	Power cable receptacle damaged.	Replace power cable receptacle (par. 55*h*).
5	Blower motor does not operate, and projection lamp does not light.	Power (on-off) switch defective.	Replace power switch (par. 55*g* and 55.1*h*).
6	Image cannot be focused sharply.	Optical system not aligned correctly.	Align optical system (par. 59).
8	Projection head assembly (fig. 3) slips left or right.	Tube-fit regulating screws (fig. 33) loose.	Adjust projection head and tighten tube-fit regulating screws (par. 58*c*).
9	Lopsided image on screen.	Mirror housing (fig. 33) not adjusted correctly.	Adjust mirror housing (par. 58*b*).

Page 69, appendix I (page 28 of C 4). Delete appendix I and substitute the following:

APPENDIX I

REFERENCES

Following is a list of references available to the maintenance personnel of Projector PH–637 (*)/PFP:

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
FM 5–25	Explosives and Demolition.
TB SIG 149	Tropicalization of Photographic Equipment.
TB SIG 189	Cold Weather Photography.

TM 9-213	Painting Instructions for Field Use.
TM 11-664	Theory and Use of Electronic Test Equipment.
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM 11-6625-203-12	Operator and Organizational Maintenance: Multimeter AN/URM-105, including Multimeter ME-77/U.
TM 11-6730-207-20P	Organizational Maintenance Repair Parts and Special Tool Lists; Projectors, PH-637/PFP, PH-637A/PFP, and Projector, Still Picture PH-637B/PFP.
TM 11-6730-207-35P	Field and Depot Maintenance Repair Parts and Special Tool Lists: Projectors PH-637/PFP, PH-637A/PFP, and Projector, Still Picture PH-637B/PFP.
TM 38-750	The Army Equipment Record System and Procedures.

BY ORDER OF THE SECRETARY OF THE ARMY:

EARLE G. WHEELER,
General, United States Army
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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USAECOM (5)
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USA Corps (3)
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USATC Engr (2)
USATC Inf (2)
USATC Armor (2)
USASTC (5)
Instl (2) except
  Ft Monmouth (63)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Sig Dep (OS) (12)
Sig Sec, GENDEP (5)
Army Dep (2) except
  Ft Worth (8)
  Lexington (12)
  Sacramento (28)
  Tobyhanna (12)
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USAPA (5)
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  11–157
  11–500 (AA–AC) (4)
  11–557
  11–587
  11–592

11–597
19–256
19–316
44–7
44–16
44–102
44–112
44–568

NG: State AG (3); units — same as active Army except allowance is one copy for each unit.

USAR: None.

For explanation of abbreviations used see AR 320–50.

Changes in force: C 2, C 4, C 5, C 6, and C 7

TM 11-2323
C 7

PROJECTORS PH-637/PFP AND PH-637A/PFP; PROJECTORS, STILL PICTURE PH-637B/PFP AND PH-637C/PFP; AND SPINNER, POLARIZER BM-34(A)

CHANGE No. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *4 December 1964*

TM 11-2323, 7 April 1954, is changed as indicated to include Spinner, Polarizer BM-34(A) procured on Order No. AF 33(657)13352.

Note. The parenthetical reference to a previous change (example: "page 1 of C 6") indicates that pertinent material was published in that change.

Change the title as shown above.

Page 3, paragraph 2*c* (page 1 of C 6), line 7. Delete the address and substitute: Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-MA, Fort Monmouth, N.J. 07703.

Page 46. Delete chapter 4 and substitute:

CHAPTER 4

AUXILIARY EQUIPMENT, SPINNER, POLARIZER BM-34(A)

48. Description and Data

a. Purpose. Spinner, Polarizer BM-34(A) (spinner) (fig. 23.2) provides the projector with an animating capability.

b. Use. The spinner is used to animate transparencies on which a special polarizing material has been preprinted or hand-set. The spinner is specifically designed for mounting on the PH-637(*)/PFP series projectors.

c. Technical Characteristics.

Operating power	110 to 125 volts, 50 to 60 cps.
Current	0.15 ampere.
Polarizer rotation	Continuously variable from 20 rpm to 180 rpm.
Motor speed	3,200 rpm (maximum)
Light transmission	38-40 percent of transmitted light.

d. Description. Spinner, Polarizer BM-34(A) (fig. 23.2) is a single, self-contained, portable unit. The high-impact styrene spinner housing contains a motor, rotating polarizer, an on-off power switch, and a variable speed control resistor to control the rotational speed of the motor and the polarizer. A neon lamp indicates when power is applied to the motor.

(1) Light from the projector passes through the stationary polarizer of the transparency and the rotating polarizer of the spinner. The optical effect of this sequence is an illusion of animation.

(2) The mounting clamp fits over the lens housing of the projector; source power for the spinner is derived from an ac convenience outlet available on certain projector models. On other models, another 115-volt ac source is used.

(3) With the mounting clamp in line with the spinner housing, the equipment measures 9.31 inches long by 6.63 inches wide by 4.59 inches deep. It weighs 2½ pounds.

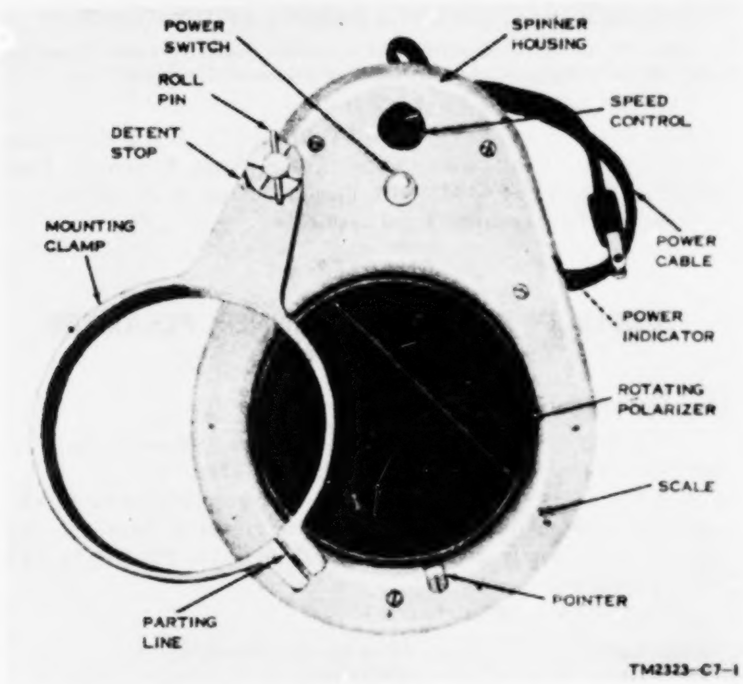

POWER SWITCH
SPINNER HOUSING
ROLL PIN
SPEED CONTROL
DETENT STOP
MOUNTING CLAMP
POWER CABLE
POWER INDICATOR
ROTATING POLARIZER
SCALE
POINTER
PARTING LINE
TM2323-C7-1

Figure 23.2 Spinner, Polarizer BM-34(A).

49. Service Upon Receipt of Equipment

(fig. 23.3)

a. Unpacking. The spinner is inserted in a vinyl bag and the vinyl bag is inserted in a fiberboard box sealed with tape.

(1) Slit the tape and open the fiberboard box.

(2) Remove the manual, the cushioning, and the spinner.

(3) Remove the spinner from the vinyl bag and remove the cushioning that has been placed between the mounting clamp and the spinner housing.

b. Checking. Carefully inspect the equipment for possible damage incurred during shipment. Pay particular attention to the rotating polarizer. If no damage is apparent, install the spinner and operate it as described in paragraph 49.1.

c. Installation. With the spinner oriented so that the power switch and speed control face upwards, slip the mounting clamp over the projector lens housing. Rotate the mounting clamp so that the parting line (fig. 23.2) faces the projector screen. Tighten the screw that secures the parting line of the mounting clamp.

d. Connections. Connect the power cable plug into an ac convenience outlet. If available, use the one on the projector.

49.1. Operation

a. Controls and Indicators (fig. 23.2).

Controls and indicator	Location	Function
Power switch	Top of spinner housing	Controls power application.
Power indicator.	Right side of spinner housing.	When lighted indicates power is applied.
Speed control	Top of spinner housing	Varies speed of spinner.
Scale	do	Marked in 30° increments numbered from 0 to 6; lines between numbers indicate 15° steps.
Pointer	do	Used in conjunction with scale to select reference point for emphasis during presentation.
Detent stop	Top of mounting clamp	Locks spinner in line with projector lens. Prevents overswing to prevent damage to controls.

b. Preliminary Instructions. Rotate the pointer manually to be sure the spinner is not binding. Be sure the projector is operating properly, and that a polarized transparency or a transparency with polarized patterns is inserted in the copyholding device of the projector.

c. Normal Operation. With the projector on, operate the spinner as follows:

(1) Pivot the spinner housing so that the rotating polarizer is in line with the projector lens. Be sure the rollpin is set in the detent stop.

Note. The detent stop on the mounting clamp limits the amount of swing to prevent knocking the power and speed controls against the clamp.

(2) Press the power switch. Check to see that the power indicator lights.

(3) Adjust the speed control for the rotational speed required by the actual presentation.

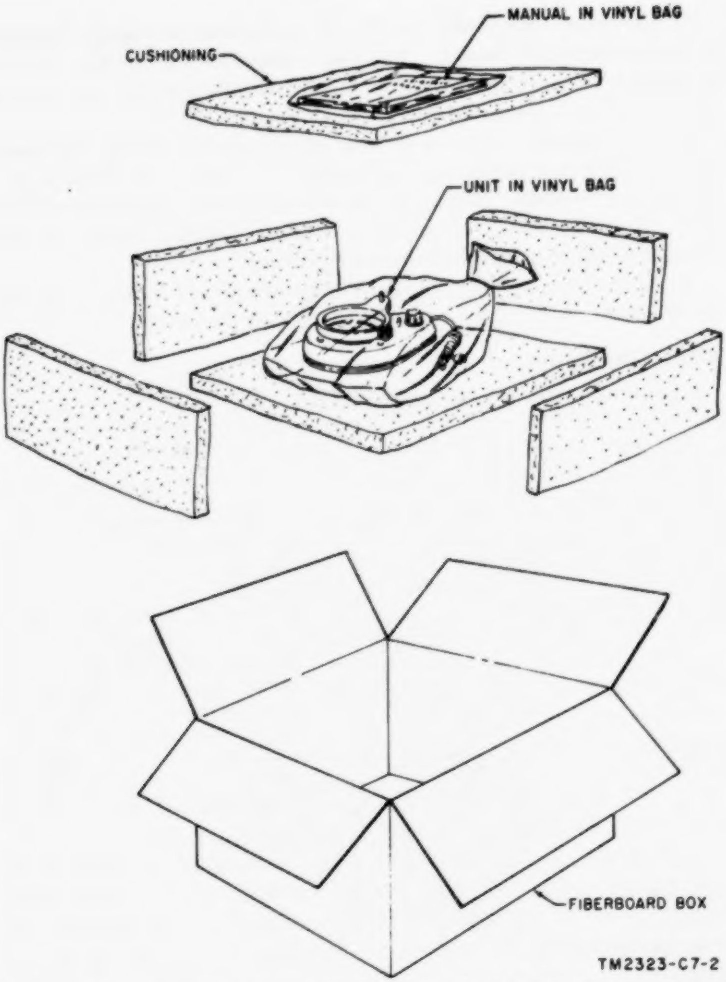

MANUAL IN VINYL BAG
CUSHIONING
UNIT IN VINYL BAG
FIBERBOARD BOX
TM2323-C7-2

Figure 23.3 Spinner, Polarizer BM-34(A), packaging and packing diagram.

(4) When the presentation has been completed, press the power switch.

(5) With the spinner motor turned off, but with the spinner housing in position, any segment of the polarizer cycle can be emphasized by rotating the pointer to the required position on the scale. This operation is used to highlight a single point in the demonstration. A slow-motion effect can be obtained by moving the pointer back and forth by hand. The scale is limited to 180°, but within this arc all effects of polarization can be demonstrated.

Caution: Do not rotate the spinner manually when power is applied.

49.2. Operation Under Unusual Conditions

The instructions for operation of the projector in artic areas (para. 32) and in tropic and desert areas (para. 34) are applicable to the spinner.

49.3. Operator's and Organizational Maintenance

a. The materials required for maintenance of the spinner are the same as those listed (para. 36) for the projector.

b. Perform the following preventive maintenance procedures daily:

(1) Check for completeness and general condition of the equipment.

(2) Clean the equipment with the lint-free cloth. Remove dust, foreign matter, and moisture from all parts before and after use.

(3) Inspect the equipment for evidences of mildew and fungi.

(4) Check to see that the power cable plug is properly secured.

(5) Apply power and check to see that the equipment is operating properly.

49.4. Functioning of Spinner

a. General.

(1) Ordinarily (unpolarized) light waves vibrate in all planes about the direction of light propagation. When these waves are directed through a single polarizer, only vibrations of a certain plane will pass through. This is simple polarization, and it produces no apparent change in the light.

(2) When light is passed through two sheets of polarizing material, each sheet of which polarizes the light in a different plane, intereference patterns are produced. These are diffraction patterns, and they appear either as parallel lines of alternating light and dark shades or as contrasting colors. The parallel lines are straight, circular, or elliptical, depending on the nature of the actual polarizing material. When one polarizing material is rotated relative to the other, the lines of polarized light appear to move.

b. Optical System. The optical system of the spinner consists of a polarized sheet which, for protection, is sandwiched between two identical round pieces of glass. The polarization pattern is uniform and light planes at any reference point remain constant.

(1) The portion of the overall pattern, design, or illustration to be animated is made of polarized transparency; the light emerging from that portion of the overall transparency mounted on the projector is polarized in a corresponding pattern.

(2) All of the light passes through the rotating polarizer to the projection lens (fig. 2). The light which passes through the unpolarized portion of the transparency projects a normal, fixed image upon the screen. The single plane of the polarized light, however, intersects continuously, at angles varying

from 0° to 90°, with the single plane of the polarizer. This portion of the projected image appears to move. The rate of motion is controlled by the rotational speed of the polarizer.

(3) In a similar manner, animation can be restricted to certain colors by using tinted polarized transparencies.

c. Electrical Circuits. The electrical circuits (fig. 23.5), which operate from a 110- to 125-volt, 50- to 60-cps power source, rotate the spinner motor and, in turn, the polarizer.

(1) When switch S1 is closed, power is applied in parallel to neon indicator DS1 and to motor B1 in series with speed control R1.

(2) The motor speed is controlled by R1 which is shunted on alternate half cycles by diode CR1. This shunting effect permits a greater range and smoothness of speed control.

49.5. Troubleshooting

a. Preliminary Procedures. If the spinner is inoperative and the cause is not immediately apparent, make sure that the trouble is not due to a defective power connection between the spinner and the ac source. Connect the spinner power cable to a 115-volt ac outlet other than that of the projector if that was originally used.

b. Troubleshooting Chart.

Symptom	Probable cause	Remedy
Power indicator does not light; polarizer does not rotate.	Defective plug	Replace plug.
	Defective cable	Repair or replace cable.
Power indicator does not light; polarizer rotates.	Defective neon lamp	Replace neon lamp.
Polarizer does not rotate	Defective variable resistor.	Replace variable resistor.
	Defective motor	Replace motor.
	Loose pulley	Tighten setscrew on pulley.
	Defective pulley or roller.	Replace pulley or roller.
	Rotating polarizer binding.	Replace rotating polarizer assembly.
	Worn or broken belt	Replace belt.
Erratic rotational speed	Defective motor	Replace motor.
	Pulley slips	Adjust motor position (para. 49.7).
Rotating polarizer operates faster than normal; speed control does not affect speed.	Diode CR1 shorted	Replace diode.
Rotating polarizer can be adjusted to below 20 rpm; speed control sensitive.	Diode CR1 open	Replace diode.

49.6. Disassembly and Reassembly

(fig. 23.4)

a. General. The preferred disassembly sequence is shown in *b* below. However, this sequence can be altered to reach a specific part for replacement purposes. Do not attempt to replace any part until it is completely accessible.

b. Disassembly.

(1) Remove the bottom cover (1) which is secured by four screws (2) and flat washers (3).

(2) Remove hexagonal nut (4) and lockwasher (5) and separate the mounting clamp and clamp post assembly (items 6 through 11) from the base plate assembly (35).

(3) Tap out the roll pin (6), and remove, as required, the remaining parts of the mounting clamp and clamp post assembly (7 through 11).

(4) Remove the top cover (12) which is secured by five screws (13) and flat washers (14).

Caution: Be very careful when removing the top cover to avoid breaking.

(5) Variable resistor (15), switch (16) and the diode (17) are mounted to the top cover. Unsolder as required. Tag the wires to insure proper replacement. Remove the knob (36), hexagonal nut (37), and flat washer (38) that secure the variable resistor; remove the collar (39) and hexagonal nut (40) to remove the switch.

(6) With a screwdriver, slip the drivebelt (18) off the motor pulley (25).

(7) Remove three retaining rings (19), and lift off three rollers (20) and the polarizer assembly (21).

(8) Unsolder the motor wires as required and tag to insure correct replacement.

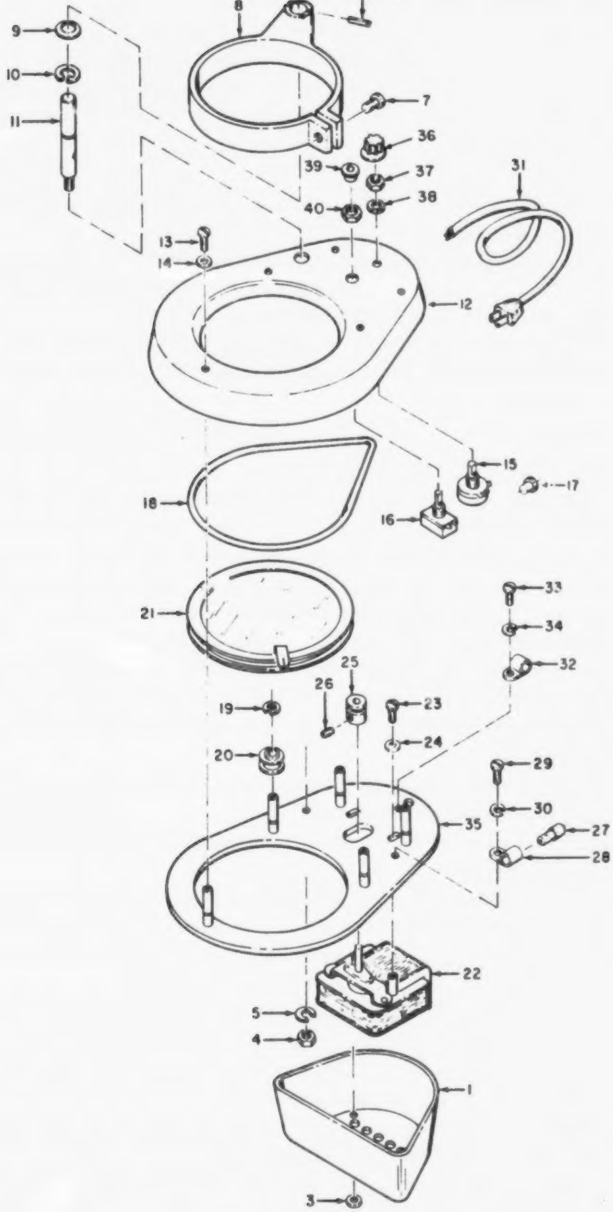
(9) Remove the motor (22) by removing the two nylon screws (23) and flat washers (24). The motor (22) and motor pulley (25) will drop as a unit from the base plate assembly (35).

(10) Loosen setscrew (26) and separate the motor (22) from the motor pulley (25).

(11) Remove the neon lamp (27) which is secured by the clamp (28), screw (29), and lockwasher (30).

(12) Remove the power cable (31) which is secured by the clamp (32), screw (33), and lockwasher (34).

c. Reassembly. Reassemble the spinner by following the disassembly procedures of *b* above in reverse order. Before replacing the top cover (12), adjust the motor drivebelt tension as described in paragraph 49.7.



TM2323-C7-4

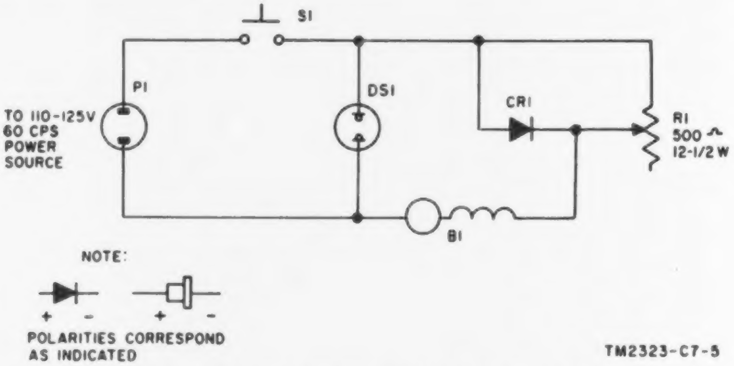
49.7. Drivebelt Tension Adjustment
(fig. 23.4)

If the polarizer does not rotate or operates erratically with a tendency to slippage, adjust the drivebelt tension as follows:

a. Remove the top cover (12) as instructed in paragraph 49.6*b* (2) and (4).

b. Loosen the nylon screws (23) that pass through the slotted holes of the base plate assembly (35) into the motor (22). The motor can now be shifted towards or away from the polarizer assembly (21).

c. To tighten the drivebelt (18), shift the motor away from the polarizer assembly. Tighten the nylon screws (23) and operate the spinner. If there is evidence of slippage or binding, loosen the screws and shift the motor position again. The desired setting is the minimum tension which permits the rotating polarizer to operate with no evidence of slippage.



TM2323-C7-5

FIGURE 23.5. *Spinner, Polarizer BM-34(A), schematic diagram.*

1	Bottom cover (A1)	21	Polarizer assembly (A3)
2	Screw (H1)	22	Motor (B1)
3	Flat washer (H2)	23	Nylon screw (H13)
4	Hex. nut (H3)	24	Flat washer (H14)
5	Lockwasher (H4)	25	Motor pulley (MP4)
6	Roll pin (H5)	26	Setscrew (H15)
7	Screw (H6)	27	Neon lamp (DS1)
8	Mounting clamp (MP1)	28	Clamp (MP5)
9	Spring washer (H7)	29	Screw (H16)
10	Retaining ring (H8)	30	Lockwasher (H17)
11	Clamp post (MP2)	31	Power cable (W1)
12	Top cover (A2)	32	Clamp (MP6)
13	Screw (H9) (5 each)	33	Screw (H18)
14	Flat washer (H10) (5 each)	34	Lockwasher (H19)
15	Variable resistor (R1)	35	Base plate assembly (A4)
16	Switch (S1)	36	Knob
17	Diode (CR1)	37	Hex. nut
18	Drivebelt (MP3)	38	Flat washer
19	Retaining ring (H11) (3 each)	39	Threaded collar
20	Roller (H12) (3 each)	40	Hex. nut

FIGURE 23.4. *Spinner, Polarizer BM-34(A), exploded view.*

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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- Sig Dep (OS) (12)
- Army Dep (2) except
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  - LXAD (14)
  - SAAD (30)
  - TOAD (14)
  - LEAD (5)
  - SHAD (3)
  - SVAD (5)
  - NAAD (3)
  - CHAD (3)
- ATAD (4)
- USACDCCBRA (1)
- USACDCOA (2)
- USACDCQMA (1)
- USACDCTA (1)
- USACDCADA (2)
- USACDCARMA (1)
- USACDCAVNA (1)
- USACDCARTYA (1)
- USACDCSWA (1)
- USACDCCEA (2)
- USAERDAW (13)
- USAERDAA (12)
- POE (1)
- Trans Tml Comd (1)
- Army Tml (1) except
  - Oakland Army Tml (5)
- AMS (1)
- WRAMC (1)
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- Sig Fld Maint Shops (2)
- 11th Air Assault Div (3)
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- Units organized under following TOE's (2 copies each unless otherwise indicated):
  - 9-87
  - 9-227
  - 9-377
  - 11-16
  - 11-57
  - 11-96
  - 11-97
  - 11-98
  - 11-116
  - 11-117
  - 11-155
  - 11-157
  - 11-337
  - 11-500 (AA-AE) (4)
  - 11-557
  - 11-587
  - 11-592
  - 11-597
  - 19-256
  - 19-316
  - 44-102
  - 44-112
  - 44-568

NG: State AG (3); units—same as Active Army except allowance is one copy for each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

Changes in force: C 2, C 4, C 5, C 7, and C 8

TM 11-2323
*C 8

CHANGE No. 8

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *13 May 1966*

PROJECTORS PH-637/PFP AND PH-637A/PFP; PROJECTORS, STILL PICTURE PH-637B/PFP AND PH-637C/PFP; AND SPINNER, POLARIZER BM-34(A) Including Repair Parts and Special Tool Lists

TM 11-2323, 7 April 1954, is changed as follows:

Title is changed as shown above.

Page 3, paragraph 2*c* (As changed by C 6, 17 Jun 64)
Delete and substitute:

c. Reporting Of Improvements. The direct reporting, by the individual user, of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended changes to DA Publications) will be used for reporting these improvements. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, N.J. 07703.

Page 69. Appendix (as changed by C 6, 17 Jun 64). Designate "APPENDIX" as APPENDIX I. Add the following references.

SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.

Delete appendixes II and III (As changed by C 6, 17 Jun 64) and substitute:

APPENDIX II

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

---

*This change supersedes C 6, 17 June 1964.

2. Columns

Columns are as follows:

a. Federal Stock Number. This column lists the 11-digit Federal stock number.

b. Designation by Model. The dagger (†) indicates model in which the part is used.

c. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

d. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

e. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

f. Quantity Authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spare Items" the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

g. Illustrations. Not used.

SECTION II. FUNCTIONAL PARTS LIST

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL				DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
									FIGURE NO.	ITEM NO.
6730-224-7033					PROJECTOR, STILL PICTURE PH-637/PFP: Overhead projector accom transparencies 4 in lg X 5 in w, 5 in lg X 7 in w, 7 in lg X 9 in w, 8 in lg X 10 in w, 10 in lg X 10 in w; lamp data incandescent projection lamp 500 w; 14 in focal lg lens, forced air ventilation; o/a dim 25 in lg, 26 in h X 17 in w; w/carrying case.					
6730-823-9716					PROJECTORS, STILL PICTURE, PH-637A/PFP; PH-637B/PFP; PH-637C/PFP Overhead projector, accom transparencies, 4 in lg X 5 in w, 5 in lg X 7 in w, 7 in lg X 9 in w, 8 in lg X 10 in w, 10 in X 10 in w lamp data incandescent projection lamp 1000 w; 14 in focal lg lens; forced air ventilation; o/a dim 21 in lg X 13-1/2 in h X 12-1/2 in w.					
					NOTE: Model Column 1 refers to PH-637/PFP; Model Column 2 refers to PH-637A/PFP; Model Column 3 refers to PH-637B/PFP; Model Column 4 refers to PH-637C/PFP.					
					ITEMS COMPRISING AN OPERABLE EQUIPMENT					
	†				PROJECTOR, STILL PICTURE PH-637/PFP: (Basic Component).		NX	1		
		†	†	†	PROJECTOR, STILL PICTURE PH-637A/PFP; PH-637B/PFP; PH-637C/PFP: (Basic Component).		NX	1		
ORD thru AGC	†	†	†	†	TECHNICAL MANUAL TM 11-2323			2		
6730-804-2194			†		ATTACHMENT: CELLOPHANE ROLL: Beseler p/n 10880 (Not installed).			2		
6730-257-3726	†	†			CABLE ASSEMBLY, POWER, ELECTRICAL: Beseler p/n 2200-34 (Not installed).			1		
6730-954-0795				†	CARRYING CASE PHOTOGRAPHIC EQUIPMENT: Buhl Optical Co. p/n 638-59 (Not installed).		NX	1		
6760-217-2583		†			CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: Beseler p/n 3275			1		
6760-256-8308	†				CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: Beseler p/n 2200-286 (Not installed).			1		
6760-823-9890			†		CARRYING CASE, PHOTOGRAPHIC EQUIPMENT: Beseler p/n 10850 (Not installed).			1		

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
											FIGURE NO	ITEM NO
							PH-637/PFP, PH-637A, B, C/PFP (continued)					
6750-319-0880			†				CELLOPHANE ROLL: Beseler p/n B.S.2.7-9 (Not installed).			1		
6730-392-9868		†					CORE, FILM: Beseler p/n 2.7-1 (Not installed).			1		
6750-537-9286		†					FILTER, HEAT: Beseler p/n 3285 (Installed in equip)			1		
6730-804-2187			†				FILTER, HEAT ABSORBING: Beseler Dwg. No. B.S.1.6-30 (Installed equip).			1		
6760-955-2035				†			FILTER, HEAT ABSORBING: Buhl Optical Co. p/n 463100 (Installed in equip).			1		
6730-964-9781				†			HOUSING, PROJECTOR: Buhl Optical Co. p/n 638-54 (Not installed).			1		
6730-804-2190			†				HOUSING, PROJECTOR: Beseler Dwg. No. 10630 (Not installed).			1		
6730-408-5502	†	†	†				MASK, PHOTOGRAPHIC: 4 in X 5 in, Beseler p/n 2200-268 (Not installed).			1		
6730-408-5503	†	†	†				MASK, PHOTOGRAPHIC: 5 in X 2 in, Beseler p/n 2200-269 (Not installed).			1		
6730-408-5504	†	†	†				MASK, PHOTOGRAPHIC: 7 in X 9 in, Beseler p/n 2200-270			1		
6730-953-2250				†			MASK, PHOTOGRAPHIC: 10 in X 10 in, Buhl Optical Co. p/n (Not installed).			1		
6730-953-2251				†			MASK, PHOTOGRAPHIC: 8 in X 10 in, Buhl Optical Co. p/n 638-50 (Not installed).			1		
6730-953-2252				†			MASK, PHOTOGRAPHIC: 7 in X 9 in, Buhl Optical Co. p/n (Not installed).			1		
6730-953-2253				†			MASK, PHOTOGRAPHIC: 5 in X 7 in, Buhl Optical Co. p/n 638-51-2 (Not installed).			1		
6730-953-2254				†			MASK, PHOTOGRAPHIC: 4 in X 5 in, Buhl Optical Co. p/n 638-51-1 (Not installed).			1		
6730-962-5485				†			MASK, PHOTOGRAPHIC: (Holder) Buhl Optical Co. p/n 638-39 (Not installed).			1		
6760-291-5857			†	†			MASK, PHOTOGRAPHIC: 8 in X 10 in, Beseler p/n 2278			1		

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FEDERAL STOCK NUMBER	DESIGNATION BY MODEL					DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
										FIGURE NO.	ITEM NO.
						PH-637/PFP, PH-637A, B, C/PFP (continued)					
6640-393-2090	†	†	†	†		PAPER, LENS: Fed Spec No. UU-P-313, type No. 1			5		
6750-392-8971		†		†		PLASTIC ROLL: Beseler p/n B.S.2.7-3 (Installed in equip).			1		
6750-537-9262	†					PLASTIC ROLL: Beseler p/n 2204-35 (Not installed).			1		

APPENDIX III
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) are listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the categories.

(*a*) *Service.* To clean, to preserve, and to replenish lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(*f*) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(*g*) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(*h*) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(*i*) *Overhaul.* To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of commodity commands. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(*j*) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *Operator, organization, direct support, general support and depot.* The symbol X indicates the categories responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Categories higher than those marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organizational, direct support, general support and depot.* The dagger (†) symbol indicates the categories normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including general support are authorized to the organization operating this equipment.

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
											FIGURE NO.	ITEM NO.
							PH-637/PFP, PH-637A, B, C/PFP (continued)					
6730-408-5505	†	†	†				MASK, PHOTOGRAPHIC: 10 in X 10 in, Beseler p/n 2200-267			1		
6730-804-2179	†	†	†				MASK, PHOTOGRAPHIC: 10 in X 10 in Holder, Beseler p/n 2276 (Not installed).			1		
6750-392-8977		†		†			PLASTIC ROLL: Beseler p/n B.S.2.7-3 (Not installed).			1		
6750-537-9262	†						PLASTIC ROLL: Beseler p/n 2204-35 (Not installed).			1		
6730-962-5486				†			POST, SUPPORTING: Buhl Optical Co. p/n 638-4 (Not installed).			1		
6730-356-7205	†						POST, SUPPORTING: Beseler p/h 2200-2232A (Not installed).			1		
6730-537-9454		†	†				POST, SUPPORTING: Beseler p/n 3200-3220 (Not installed).			1		
6730-804-2180			†				PROJECTION HEAD ASSEMBLY: Beseler p/n 10615 (Not installed).			1		
6730-395-9736	†						PROJECTOR, SUBASSEMBLY: Beseler p/n 2200-2256 (Not installed).			1		
6730-962-5487				†			PROJECTION HEAD ASSEMBLY: Buhl Optical Co. p/n 638-93 (Not installed).			1		
6730-395-9737		†					PROJECTOR, SUBASSEMBLY: Beseler p/n 3200-3217 (Not installed).			1		
6730-356-5605	†	†					ROLLER ATTACHMENT: Beseler p/n 2204 (Not installed).			2		
6730-472-7281			†				SPOOL: Beseler p/n B.S.2.7-8 (Not installed).			1		
6730-955-2033				†			SPOOL: Buhl Optical Co. p/n 463110 (Installed in equip).			1		
6730-356-7199	†						TUBE: Beseler p/n 2204-36 (Not installed).			1		
6730-392-9868		†					TUBE: Beseler p/n 2.7-1 (Not installed).			1		
							RUNNING SPARE, ITEMS					
6750-319-0880			†				CELLOPHANE ROLL: Beseler p/n B.S.2.7-9			1		
6240-143-3044		†	†				LAMP, INCANDESCENT: G.E. p/n 1M/T20Mp			4		
6240-143-7468	†						LAMP, INCANDESCENT: G.E.p/n 500T20P-115			1		
6240-995-9262				†			LAMP, INCANDESCENT: G.E. p/n DRS115V1000WT-20MPF-C13 (Not installed).			4		

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
						FIGURE NO.	ITEM NO.
6740-788-6978		SPINNER, POLARIZER BM-34A: 4 in lg X 6 in w X 9 in h o/a; create the illusion of movement from a satictranspancy. Technical Animations Inc. p/n 4291					
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
		SPINNER POLARIZER BM-34A (Basic Component)		NX	1		
ORD thru AGC		TECHNICAL MANUAL TM 11-2323			2		
		RUNNING SPARE ITEMS					
		NO PARTS AUTHORIZED FOR STOCKAGE AT OPERATORS LEVEL					

SECTION III. DIRECT AND GENERAL SUPPORT AND DEPOT FUNCTIONAL PARTS LIST

SOURCE CODE A	B	C	D	FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION FIGURE NO.	ILLUSTRATION ITEM NO.
				6740-788-6978		SPINNER, POLARIZER BM-34A: 4 in lg h v 6 in w by 9 in h o/a; create the illusion of movement from a static transparency; Technical Animations Inc p/n 4291		MX						
	[illegible]		D			BASE PLATE ASSEMBLY: Technical Animations Inc p/n 4291-15			1				4	35,A4
	[illegible]		D			ROLLER, SPINNER: Technical Animations Inc p/n 4291-17			3				4	20,H12
	[illegible]		D			RING, RETAINER: Truarc p/n 5133-21			3				4	19,H11
			D	6740-909-1282		POLARIZER ASSEMBLY: Technical Animations Inc p/n 3562-6			1	0.7	0.3	1.0	4	21,A3
			D	6105-903-7726		MOTOR, SPINNER: Barber Coleman p/n DYAA11302-8			1	0.7	0.3	1.0	4	22,B1
			D	5305-912-9569		SCREW, ASSEMBLED WASHER: Product Components Corp p/n 10.32 X 1/2			2	1.0	0.3	1.0	4	23,H13
			D	3020-919-0140		PULLEY MOTOR: Technical Animation Inc p/n 3562-9			1	0.7	0.3	1.0	4	25,MP4
			D	3030-905-3703		BOLT, DRIVE: Linear Inc p/n 11-049/7348-65-0			1	1.0	0.5	20.2	4	18,MP3
	[illegible]		D			COVER MOTOR: Technical Animations Inc p/n			1				4	1,A1
	[illegible]		D			WASHER, FLAT: MS15795-303			5				4	13,H9
	[illegible]		D			SCREW, MACHINE: MS35234-13			5				4	14,H10
	[illegible]		D			POST, CLAMP: Technical Animations Inc p/n 4291-10			1				4	11,MP2
	[illegible]		D			WASHER, LOCK: MS35337-86			1				4	5,H4
	[illegible]		D			NUT, HEX: MS3569-410			1				4	4,H3
	[illegible]		D			CLAMP, MOUNTING: Technical Animation Inc p/n 4291-11			1				4	8,MP1
	[illegible]		D			RING, RETAINER: Truarc p/n 5133-37			1				4	10,MP3

SECTION II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
PROJECTOR, PH-637/PPP, PH-637A, B, C/PPP	service	X						
	adjust		X				1	
	inspect	X						
	test		X				3	Continuity of switches and electrical conductors.
					X		4,5	
	repair		X				1	Replacement switches, knobs, connectors etc.
					X		1,2	
	rebuild					X	1,2,4,5	

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SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOL CODE	REMARKS
PH-637/PFP, PH-637A, B, C/PFP (continued)							
TOOL KIT TK-77/GF		†	†	†	†	1	
TOOL EQUIPMENT TK-109/GF			†	†	†	2	
MULTIMETER AN/URM-105		†				3	
MULTIMETER TS-352/U			†			4	
METER, FOOT CANDLE, PHOTOELECTRIC ME-86/U				†		5	

SECTION IV. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
SPINNER, POLARIZER BM-34A	service	X						
	adjust	X						
	inspect	X						
	test		X				2	
	repair		X				1	
	rebuild					X	1	
	overhaul				X		1	

SECTION V. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOL CODE	REMARKS
SPINNER, POLARIZER PM-34A							
TOOL KIT TK-77/UP		†	†	†	†	1	
MULTIMETER AN/URM-105		†	†	†	†	2	

Add appendix IV:

APPENDIX IV (Added)
ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE REPAIR PARTS LIST

Section I. INTRODUCTION

1. General

a. This manual includes an organizational, direct and general support, and depot maintenance special tool list.

(1) The organizational maintenance repair parts and special tool list lists the quantities of repair parts authorized for organizational maintenance and is a basis for requisitioning by organizations which are authorized the major item of equipment. End items of equipments are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

(2) Direct and general support and depot maintenance repair parts and special tool list shows the quantities of repair parts authorized for direct and general support maintenance and is a basis for requisitioning authorized parts. It is also a guide for depot maintenance in establishing initial levels of spare parts.

b. Columns are as follows:

(1) *Source, maintenance, and recoverability code.* Source, maintenance, and recoverability codes indicate the commodity command responsible for supply, the maintenance category at which an item is stocked, categories at which an item is installed or repaired, and whether an item is repairable or salvageable. The source code column is divided into four parts.

(*a*) *Column A.* This column indicates the materiel code and designates the area of responsibility for supply. AR 310-1 defines the basic numbers used to identify the materiel code. If the part is Signal materiel responsibility, the column is left blank.

(*b*) *Column B.* This column indicates the point within the maintenance system where the part is available. "X2"—applies to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain from salvage; if not obtainable from salvage, such repair parts will be requisitioned with supporting justification through normal supply channels.

(c) *Column C.* This column indicates the lowest maintenance categories authorized to install the part. "O"—Organizational maintenance (operator and organizational)

(d) *Column D.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* Not used.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items are indicated by NX. Expendable items are not annotated.

(7) *Quantity incorporated in unit.* This column lists the quantity of each part found in a given assembly, component, or equipment.

(8) *Organizational.* The quantities indicated in this column are maximum levels of repair parts authorized to be kept on hand by units performing organizational maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(9) *Direct support.* This column indicates quantities of repair parts authorized for initial stockage for use in the direct support maintenance and in supply support to organization. The quantities are based on 100 equipments to be maintained for a 15-day period.

(10) *General support.* The numbers in this column indicate quantities of repair parts authorized for initial stockage for use in general support maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(11) *Depot.* The numbers in this column indicate quantities of repair parts authorized for depot maintenance and for initial stockage for maintenance, and for supply support to lower categories. The entries are based on the quantity required for rebuild of 100 equipments.

(12) *Illustration.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

2. Parts for Maintenance

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

3. Additional Repair Parts Authorization

An asterisk (*) in the column titled "15-Day Maintenance Allowance per 100 Equipments" indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.

4. Requisitioning Information (organizational)

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} = \text{Number of parts authorized.}$$

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts authorized is less than one, the quantity authorized will be one.

(2) For all values above one, fractional values below 0.5 will revert to the next lower number, fractional values of 0.5 or larger will advance to the next higher whole number.

c. The number of parts authorized, determined after application of *a* and *b* above, represent one prescribed load for a 15-day period. The items and computed quantities thereof must be on hand or on order at all times.

d. Major commanders will determine the number of prescribed loads second echelon units and organizations will carry. Unit and organizations authorized additional prescribed loads will utilize the formula explained in *a* above but will multiply the number of equipments supported by the number of authorized prescribed loads before completing the formula. Fractional values will be rounded to whole numbers as described above.

5. Requisitioning Information (Direct and General Support)

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for initial stockage for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} = \text{Number of parts authorized for initial stockage.}$$

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts authorized is less than 0.5, the quantity authorized will be zero.

(2) When the total number of parts authorized is between 0.5 and 1.0, the quantity authorized will be one.

(3) For all values above one, fractional values below 0.5 will revert to the next lower whole number and fractional value 0.5 and above will advance to the next higher whole number.

c. The quantities determined in accordance with the above computation represent the initial stockage for a 15-day period.

SECTION II. ORGANIZATIONAL FUNCTIONAL PARTS LIST

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
6740-788-6978		SPINNER, POLARIZER SM-34A: 4 in lg h v 6 in w by 9 in h o/a; create the illusion of movement from a satic transparency; Technical Animations Inc p/n 4291		NX				
		BASE PLATE ASSEMBLY: Technical Animations Inc p/n 4291-15			1		4	35,A4
		ROLLER, SPINNER: Technical Animations Inc p/n 4291-17			3		4	20,H12
		RING, RETAINER: Truarc p/n 5133-21			3		4	19,H11
6740-909-1282		POLARIZER ASSEMBLY: Technical Animations Inc p/n 3562-6			1	*	4	21,A3
6105-903-7726		MOTOR, SPINNER: Barber Coleman p/n DYAA11302-8			1	*	4	22,B1
5305-912-9569		SCREW, ASSEMBLED WASHER: Product Components Corp; p/n 10.32 X 1/2			2	*	4	23,H13
3020-919-0140		PULLEY MOTOR: Technical Animation Inc p/n 3562-9			1	*	4	25,MP4
3030-905-3703		BELT, DRIVE: Linear Inc p/n 11-049/7348-65-0			1	2.2	4	18,MP3
		COVER MOTOR: Technical Animations Inc p/n			1		4	1,A1
		WASHER, FLAT: MS15795-303			5		4	13,H9
		SCREW, MACHINE: MS35234-13			5		4	14,H10
		POST, CLAMP Technical Animations Inc p/n 4291-10			1		4	11,MP2
		WASHER, LOCK: MS35337-86			1		4	5,H4
		NUT, HEX: MS[illegible]3690-410			1		4	4,H3
		CLAMP, MOUNTING: Technical Animation Inc p/n 4291-11			1		4	8,MP1
		RING, RETAINER: Truarc p/n 5133-37			1		4	10,H8
		WASHER, LOCK: MS35337-84			1		4	34,H19
		ROLLPIN: 3/32 dia X 3/4 lg			1		4	6,H5
		SCREW, FILLISTER HEAD: MS35275-65			1		4	7,H6

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGANIZATIONAL	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
		BN-34A (Continued)						
		COVER, TOP: Technical Animations Inc p/n 4291-12			1		4	12,A2
5005-921-4822		RESISTOR, VARIABLE: Mallory & Co p/n QSQ8500			1	•	4	15,R1
5960-671-7262		SEMICONDUCTOR, DEVICE DIODE: North American Electronics Inc p/n NL40			1	•	4	17,CR1
5930-954-5872		SWITCH, PUSH: Leviton Mfg Co. p/n 579			1	•	4	16,S1
6240-782-5648		LAMP, GLOW: General Electric Co p/n NE2ER6E			1	•	4	27,DS1
		CLAMP: Technical Animations Inc p/n 1476			2		4	28,32, MP5,MP6
		WASHER, LOCK: MS35337-79			2		4	30,34, H17,H19
		SCREW, MACHINE: MS24584-23			2		4	29,33, H16,H18
		SCREW SET: AN565-DC-4-2			1		4	26,H15
6150-904-5688		CORD ASSEMBLY, ELECTRICAL: E R Wire & Cable Corp p/n 18-25PT			1	•		31,W1

SECTION III. DIRECT AND GENERAL SUPPORT AND DEPOT FUNCTIONAL PARTS LIST

SOURCE CODE A B C D	FEDERAL STOCK NUMBER	DESIGNATION OF MODEL	DESCRIPTION	UNIT OF MEAS	SMR	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION FIGURE NO.	ILLUSTRATION ITEM NO.
	6740-788-6978		SPINNER, POLARIZER BM-3AA: 8 in lg by 6 in w by 9 in h o/a; create the illusion of movement from a static transparency; Technical Animations Inc p/n 4291		MX						
[illegible]			BASE PLATE ASSEMBLY: Technical Animations Inc p/n 4291-15			1				4	35,A4
[illegible]			ROLLER, SPINNER: Technical Animations Inc p/n 4291-17			3				4	20,K1
[illegible]			RING, RETAINER: Truarc p/n 5133-21			3				4	19,K1
D	6740-909-1262		POLARIZER ASSEMBLY: Technical Animations Inc p/n 3562-6			1	0.7	0.3	1.0	4	21,A3
D	6105-903-7726		MOTOR, SPINNER: Barber Coleman p/n DYAA11302-8			1	0.7	0.3	1.0	4	22,B1
D	5305-912-9569		SCREW, ASSEMBLED WASHER: Product Components Corp p/n 10.32 X 1/2			2	1.0	0.3	1.0	4	23,K13
D	3020-919-0140		PULLEY MOTOR: Technical Animation Inc p/n 3562-9			1	0.7	0.3	1.0	4	25,MP4
D	3030-905-3703		BOLT, DRIVE: Linear Inc p/n 11-049/7348-65-0			1	1.0	0.5	20.2	4	18,MP3
[illegible]			COVER MOTOR: Technical Animations Inc p/n			1				4	1,A1
[illegible]			WASHER, FLAT: MS15795-303			5				4	13,M9
[illegible]			SCREW, MACHINE: MS35234-13			5				4	14,M1
[illegible]			POST, CLAMP: Technical Animations Inc p/n 4291-10			1				4	11,MP
[illegible]			WASHER, LOCK: MS35337-86			1				4	5,M4
[illegible]			NUT, HEX: MS3569-410			1				4	4,M3
[illegible]			CLAMP, MOUNTING: Technical Animation Inc p/n 4291-11			1				4	8,MP1
[illegible]			RING, RETAINER: Truarc p/n 5133-37			1				4	10,M8

SOURCE CODE	FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION FIGURE NO.	ILLUSTRATION ITEM NO.
			BM-33A (Continued)								
[illegible]			WASHER, LOCK: MS35227-8A			1				4	34,H19
[illegible]			ROLLPIN: 3/32 dia X 3/4 lg			1				4	6,H5
[illegible]			SCREW, FILLISTER HEAD: MS35275-65			1				4	7,H6
[illegible]			COVER, TOP: Technical Animations Inc p/n 4291-12			1				4	12,A2
D	5005-921-4822		RESISTOR, VARIABLE: Mallory & Co p/n Q3C0500			1	0.7	0.3	3.0	4	15,R1
D	5960-671-7262		SEMICONDUCTOR, DEVICE DIODE: North American Electronics Inc p/n NL40			1	0.7	0.3	3.0	4	17,CR1
D	5930-954-5872		SWITCH, PUSH: Leviton Mfg Co p/n 579			1	1.0	0.5	3.0	4	16,S1
D	6240-782-5648		LAMP, GLOW: General Electric Co p/n NE2E68			1	9.0	0.5	3.0	4	27,DS1
[illegible]			CLAMP: Technical Animations Inc p/n 1476			2				4	28,32, MP5, MP6
[illegible]			WASHER, LOCK: MS35337-79			2				4	30,34, H17, H19
[illegible]			SCREW, MACHINE: MS24584-23			2				4	29,33, H16, H18
[illegible]			SCREW SET: AN565-DC-4-2			1				4	26,H15
D	6150-904-5688		CORD ASSEMBLY, ELECTRICAL: E R Wire & Cable Corp p/n 18-25FT			1	0.7	0.3	1.0		31,W1

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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- USA Avn Comm Cen (5)
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- WRAMC (1)
- Army Pic Cen (2)
- USASPTCP (11)
- Instl (2) except
  - Ft Monmouth (70)
  - Ft Hancock (4)
  - Ft Gordon (10)
  - Ft Huachuca (10)
  - Ft Knox (12)
  - Ft Carson (25)
- AMS (1)
- WSMR (5)
- Gen Dep (2)
- Sig Sec, Gen Dep (5)
- Sig Dep (12)
- Army Dep (2) except
  - LBAD (14)
  - SAAD (30)
  - TOAD (14)
  - FTWOAD (10)
  - LEAD (7)
  - SHAD (3)
  - NAAD (5)
  - SVAD (5)
  - CHAD (3)
  - ATAD (10)
- USACRREL (2)
- USAERDAA (2)
- USAERDAW (13)
- Sig FLDMS (2)
- MAAG, Cambodia (5)
- MAAG ,Vietnam (5)
- MAAG, Republic of China (5)
- MAAG, Belgium, Luxembourg (5)
- MAAG, Italy (5)
- MAAG, Norway (5)
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- Mil Msn, Ecuador (5)
- Mil Msn, El Salvador (5)
- Units org under fol TOE's (2 copies each):
  - 9-87

9–227
9–377
11–57
11–96
11–97
11–98
11–117
11–127
11–155
11–157
11–158
11–500 (FJ, FK, FL)
11–587
11–592
11–597
19–256
19–316
44–102
44–112
44–568

NG: State AG (3); units—same as active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320–50

Changes in force: C2, C4, C5, C7, C8, and C9

CHANGE No. 9

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *5 October 1973*

PROJECTORS PH-637/PFP AND PH-637A/PFP; PROJECTORS, STILL PICTURE PH-637B/PFP AND PH-637C/PFP; AND SPINNER, POLARIZER BM-34(A)

(Including Repair Parts and Special Tool Lists)

TM 11-2323, 7 April 1954, is changed as follows:

Page 3, paragraph 1.1. Delete paragraph 1.1 and substitute:

1.1. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

Paragraph 2. Delete paragraph 2 and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP Pub 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 (Army)/NAVSUP Pub 459 (Navy)/AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

2.1. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL–MA–S Fort Monmouth, NJ 07703.

Page 4, paragraph 4. Change title of paragraph 4 to

Table of Components and Dimensions"

After paragraph 4 add:

4.1. Items Comprising an Operable Equipment

FSN	QTY	Nomenclature, part No., and mfr code	Usable on code
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708–42 and used to identify manufacturer, distributor, Government agency, etc. NOTE In usable on code column, number 1 refers to Projector, Still Picture PH637/PFP; number 2 refers to Projector, Still Picture PH–637A/PFP; number 3 refers to Projector, Still Picture PH 637B/PFP; number 4 refers to Projector,Still Picture PH–637C/PFP.	
6730–804–2194	2	Attachments, Cellophane Roll: 10880, 07056 (Not installed)	1,2,3,4
6730–257–3726	1	Cable Assembly, Power, Electrical: 2200–34, 07056 (Not installed)	1.2
6750–319–0880	1	Cellophane Roll: B.S.2.7–9, 07056 (Not installed)	3
6730–392–9868	1	Core, Film: 2.7–1, 07056 (Not installed)	2
6750–537–9286	1	Filter, Heat: 3285, 07056 (Installed in equip)	2
6730–804–2187	1	Filter, Heat Absorbing: B.S.1.6–30, 07056 (Installed in equip)	3
6760–955–2035	1	Filter, Heat Absorbing: 463100, 09624 (Installed in equip)	4

FSN	QTY	Nomenclature, part No., and mfr code	Usable on code
6730-964-9781	1	Housing, Projector: 638-54, 09624 (Not installed)	4
6730-804-2190	1	Housing, Projector: 10630, 07056 (Not installed)	3
6730-408-5502	1	Mask, Photographic: 4 in. x 5 in., 2200-268, 07056 (Not installed)	1,2,3,
6730-408-5503	1	Mask, Photographic: 5 in. x 2 in., 2200-269, 07056 (Not installed)	1,2,3
6730-408-5504	1	Mask, Photographic: 7 in. x 9 in., 2200-270, 07056	1, 2, 3
6730-953-2250	1	Mask, Photographic: 10 in. x 10 in., 09624 (Not installed)	4
6730-953-2251	1	Mask, Photographic: 8 in. x 10 in., 638-50, 09624 (Not installed)	4
6730-953-2252	1	Mask, Photographic: 7 in. x 9 in., 09624 (Not installed	4
6730-953-2253	1	Mask, Photographic: 5 in. x 7 in., 638-51-2, 09624 (Not installed)	4
6730-953-2254	1	Mask, Photographic: 4 in. x 5 in., 638-51-1, 09624 (Not installed)	4
6730-962-5485	1	Mask, Photographic: (Holder) 638-39, 09624 (Not installed)	4
6760-291-5857	1	Mask, Photographic: 8 in. x 10 in., 2278, 07056	3, 4
6730-408-5505	1	Mask, Photographic: 10 in. x 10 in., 2200-267, 07056	1,2,3
6730-804-2179	1	Mask, Photographic: 10 in. x 10 in., Holder, 2276, 07056 (Not installed)	1,2,3
6750-392-8971	1	Plastic Roll: B.S.2.7-3, 07056 (Not installed)	2,4
6750-537-9262	1	Plastic Roll: 2204-35, 07056 (Not installed)	1
6730-962-5486	1	Post, Supporting: 638-4, 09624 (Not installed)	
6730-356-7205	1	Post, Supporting: 2200-223A, 07056 (Not installed)	1
6730-537-9454	1	Post, Supporting: 3200-3220, 07056 (Not installed)	2,3
6730-804-2180	1	Projection Head Assembly: 10615, 07056 (Not installed)	3
6730-395-9736	1	Projection, Subassembly: 2200-2256, 07056 (Not installed)	1

FSN	QTY	Nomenclature, part No., and mfr code	Usable on code
6730-962-5487	1	Projection Head Assembly: 638-93, 09624 (Not installed)	4
6730-395-9737	1	Projection, Subassembly: 3200-3217, 07056 (Not installed)	2
6730-356-5605	2	Roller Attachment: 2204, 07056 (Not installed)	1,2
6730-472-7281	1	Spool: B.S.2.7-8, 07056 (Not installed)	3
6730-955-2033	1	Spool: 463110, 09624 (Installed in equip)	4
6730-356-7199	1	Tube: 2204-36, 07056 (Not installed)	1
6730-392-9868	1	Tube: 2.7-1, 07056 (Not Installed)	2

4.2. Expendable Consumable Items.

A list of expendable consumable items required for operation appears in table 1-1.

Table 1-1. Expendable Consumable Supplies and Materials

The supplies and material listed in this table are required for operation of this equipment and are authorized to be requisitioned by SB 700-50. The FSN for the applicable unit of issue required can be found in appropriate supply catalogs. The FSCM is used as an element in item identification to designate manufacturer or distributor or Government agency, etc., and is identified in SB 708-42.

Item	Description	Ref No. and FSCM	FSC
1	Paper, Lens: Type No. 1	UU-P-313; 81348	6640

Page 69, appendix II. Delete appendix II an substitute.

APPENDIX II

BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

1. Scope

This appendix lists basic issue items required by the crew/operator for installation, operation, and maintenance of

Projectors PH-637/PFP and PH-637A/PFP; Projectors, Still Picture PH-637B/PFP and PH-637C/PFP; and Spinner, Polarized BM-34(A).

2. General.

This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Items List—Section II. A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

b. Items Troop Installed or Authorized List—Section III. Not applicable.

3. Explanation of Columns.

The following provides an explanation of columns found in the tabular listings:

a. Illustration. Not applicable. This column is divided as follows:

b. Federal Stock Number. Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 708-42.

e. Description. Indicates the Federal item name and a minimum description required to identify the item.

f. Unit of Measure (U/M). Indicates the standard of basic quantity of the listed items as used in performing in the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation, (e.g., ea, in., pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

g. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the basic issue item furnished with the equipment.

4. Special Information

Usable on codes are included in the description of column. Uncoded items are applicable to all models. Identification of the usable on codes are as follows:

Code	*Used on*
1	PH–637/PFP
2	PH–637A/PFP
3	PH–637B/PFP
4	PH–637C/PFP

SECTION II. BASIC ISSUE ITEMS LIST

(1) ILLUSTRATION (A) FIG. NO.	(1) ILLUSTRATION (B ITEM NO.	(2) FEDERAL STOCK NUMBER	(3) PART NUMBER	(4) FSCM	(5) DESCRIPTION	USABLE ON CODE	(6) UNIT OF MEAS	(7) QTY FURN WITH EQUIP
		6730–954–0795	638–59	09624	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT, (NOT INSTALLED)	4	EA	1
		6760–217–2583	3275	07056	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT	2	EA	1
		6760–256–8308	2200–288	07056	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT, (NOT INSTALLED)	1	EA	1
		6760–823–9890	10850	07056	CARRYING CASE, PHOTOGRAPHIC EQUIPMENT, (NOT INSTALLED)		EA	1
					SPINNER, POLARIZER BM–34A			
				21299	COVER MOTOR		EA	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

Active Army:

USASA (2)
CNGB (1)
ACSC-E (2)
Dir of Trans (1)
COE (1)
TSG (1)
USAARENBD (1)
USAMB (10)
AMC (1)
FORSCOM (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (4)
LOGCOMD (3)
MICOM (2)
TECOM (2)
USASTRATCOM (4)
MDW (1)
Armies (2)
CorOs (2)
HISA (ECOM) (21)
Svc Colleges (1)
USASESS (5)
USAADS (2)
USAFAS (2)
USAARMS (2)
USAIS (2)
USAES (2)
USAINTS (3)
WRAMC (1)
USACDEC (10)
ATS (1)
MAAG (1)
USARMIS (1)
AV Comm Cen (1)

Instl (2) except
  Fort Gordon (10)
  Fort Huachuca (10)
  Fort Carson (10)
  Ft Richardson (ECOM) (2)
Army Dep (2) except
  LBAD (14)
  SAAD (30)
  TOAD (14)
  LEAD (7)
  ATAD (10)
USA Dep (2)
Sig Sec USA Dep (5)
Sig Dep (5)
Sig FLDMS (2)
USAERDAA (1)
USAERDAW (1)
Units org under fol TOE: (1 cy ea)
  9-247
  9-550
  11-96
  11-97
  11-98
  11-117
  11-127
  11-158
  11-500 (AA-AC)
  19-256
  19-316
  29-134
  29-136
  44-112
  44-102
  44-568

NG: State AG (3); Units — Same as Active Army.

USAR: None

For explanation of abbreviations used, see AR 310-50.

*TM 11-2323

TECHNICAL MANUAL }
No. 11-2323 }

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *7 April 1954*

PROJECTORS PH-637/PFP AND PH-637A/PFP

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*This manual supersedes TB SIG 236/TO 10-20D-3, 8 September 1952.

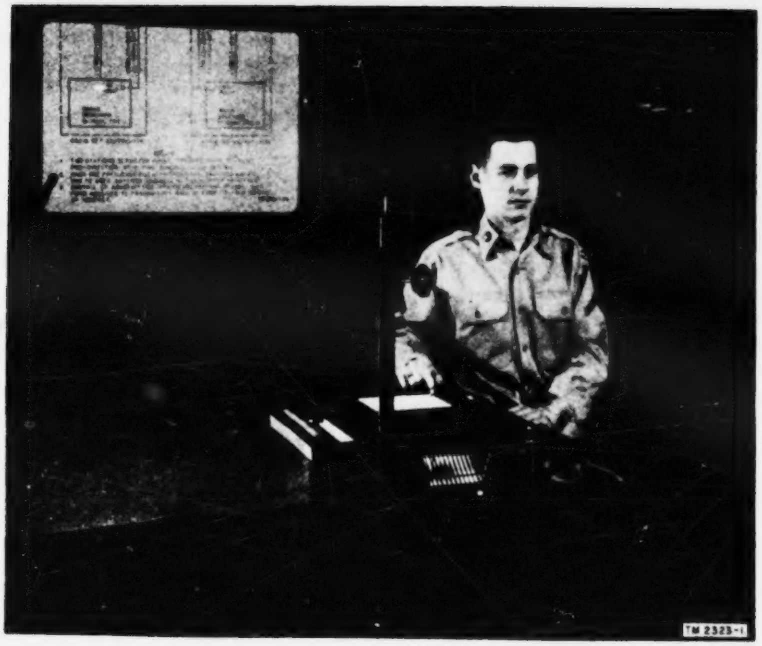

Figure 1. Projector PH-637/PFP in use.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This technical manual is published for the information and guidance of all concerned. It contains information on operation, organizational and field maintenance, and theory of operation, as well as a description of components. These instructions apply only to Projectors PH-637/PFP and PH-637A/PFP.

b. The Appendix contains a list of current references, including technical manuals and other available publications applicable to the equipment.

c. In this manual, Projector PH-637(*)/PFP refers to both PH-637/PFP and PH-637A/PFP.

2. Forms and Records

Forms used for reporting unsatisfactory conditions of Army equipment and in performing preventive maintenance are listed in the appendix.

Section II. DESCRIPTION AND DATA

3. General

(figs. 1 and 2)

Projector PH-637(*)/PFP is used to project transparencies on a screen. The transparency projected may be a slide, a sheet of acetate or plastic on which the operator writes or draws, or some other transparent medium suitable for projection. The image is projected to a screen behind the operator so that he can face the audience while operating the equipment and lecturing. The projector consists essentially of a housing that contains a projection lamp, an optical system, a projection stage, and a projection head assembly that includes a lens and mirror. The head assembly is mounted on a support post attached to the housing. All components, with the exception of the stand, are packed in a portable carrying case. The stand, which is furnished only with some procurements of Projector PH-637A/PFP, is packed in a separate carton.

4. Table of Components

(figs. 2, 3, and 4)

Quantity	Component	Dimensions (in.)			Weight (lb)
		Length	Width	Height	
1	Carrying case:				
	PH–637/PFP	23½	15½	26½	25
	PH–637A/PFP	25½	17½	17½	29
1	Housing:				
	PH–637/PFP	21½	14½	13½	------
	PH–637A/PFP (including roll attachment).	23½	14½	13½	24
1	Projection head assembly	24½	9¼	8¼	6
	Projection lamp[a]	7	7	3	¼
1	Roll attachment (PH–637/PFP only)	13½	4	3	1½
1	Lens cap	4½	5	¾	⅛
1	Support post	24¾	2	2	1½
1	Projector stand[b]	20	12	18	------
	Cellophane or plastic[c]	10½	2¼	2¼	¾
1	Aperture plate holder	12¼	11⅝	¾	¼
	Aperture plates:				
	1 of $3\frac{11}{16}''$ x $4\frac{5}{8}''$ aperture	10	10	¼	½
	1 of $4\frac{11}{16}''$ x $6\frac{5}{8}''$ aperture	10	10	¼	½
	1 of $6\frac{11}{16}''$ x $8\frac{11}{16}''$ aperture	10	10	¼	¼
	1 of $7\frac{11}{16}''$ x $9\frac{11}{16}''$ aperture (PH–637A/PFP only).	12¼	11⅝	¾	½
1	Power cable	8	7	2	1
5 (packages)	Lens tissue	5¼	3¼	½	⅛

[a] One 500-watt lamp furnished with the PH–637/PFP; five 1,000-watt lamps furnished with the PH–637A/PFP.

[b] Furnished only with some procurements of the PH–637A/PFP.

[c] One roll furnished with the PH–637/PFP; two rolls furnished with the PH–637A/PFP.

5. Description of Components

(figs. 2, 3, 4, and 5)

a. Housing. The housing is made of black, crackle-finish, riveted, sheet aluminum. Two collapsible shelves are provided for the PH–637/PFP; one at the front is used as an arm rest, and one at the left side is used to hold copy, notes, and other lecture materials. The PH–637A/PFP has a collapsible shelf at the left side and a hinged projection-stage cover that extends out over the front of the projector to form a shelf. A door at the rear, held in the closed position by a knurled captive screw, opens to expose a reflector and projection lamp. A similar door on the left side gives access to a glass condenser lens,

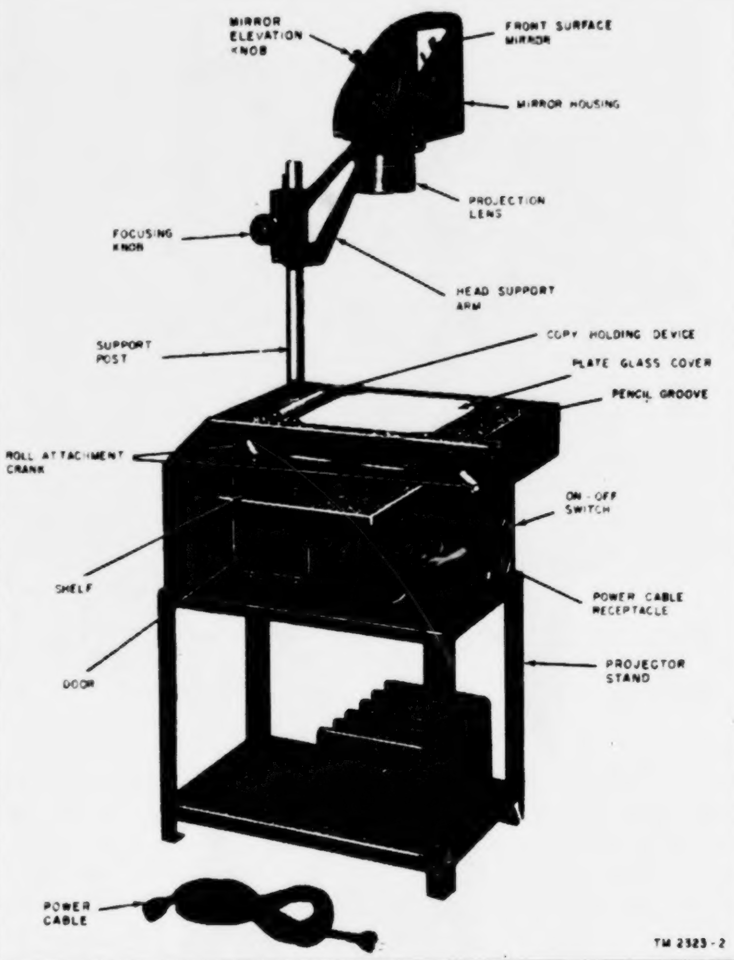
MIRROR ELEVATION KNOB
FRONT SURFACE MIRROR
MIRROR HOUSING
PROJECTION LENS
FOCUSING KNOB
HEAD SUPPORT ARM
SUPPORT POST
COPY HOLDING DEVICE
PLATE GLASS COVER
PENCIL GROOVE
ROLL ATTACHMENT CRANK
ON - OFF SWITCH
SHELF
POWER CABLE RECEPTACLE
DOOR
PROJECTOR STAND
POWER CABLE
TM 2323 - 2

Figure 2. Projector PH-637A/PFP on projector stand.

a rear surface mirror, and the bottom of a Fresnel condenser lens. A blower, which cools the lamp when it is turned on, is located in the lower front part of the housing. An ON-OFF switch and a receptacle connector for the power cord are on the front of the housing. On top of the housing are a 1¼-inch hole, through which the head-support post is inserted, and the projection stage. The projection stage is a plate-glass cover, held in place over a 10- by 10-inch opening by retaining strips. The Fresnel condenser lens rests in grooves under the plate-glass cover. In front of the projection stage on top

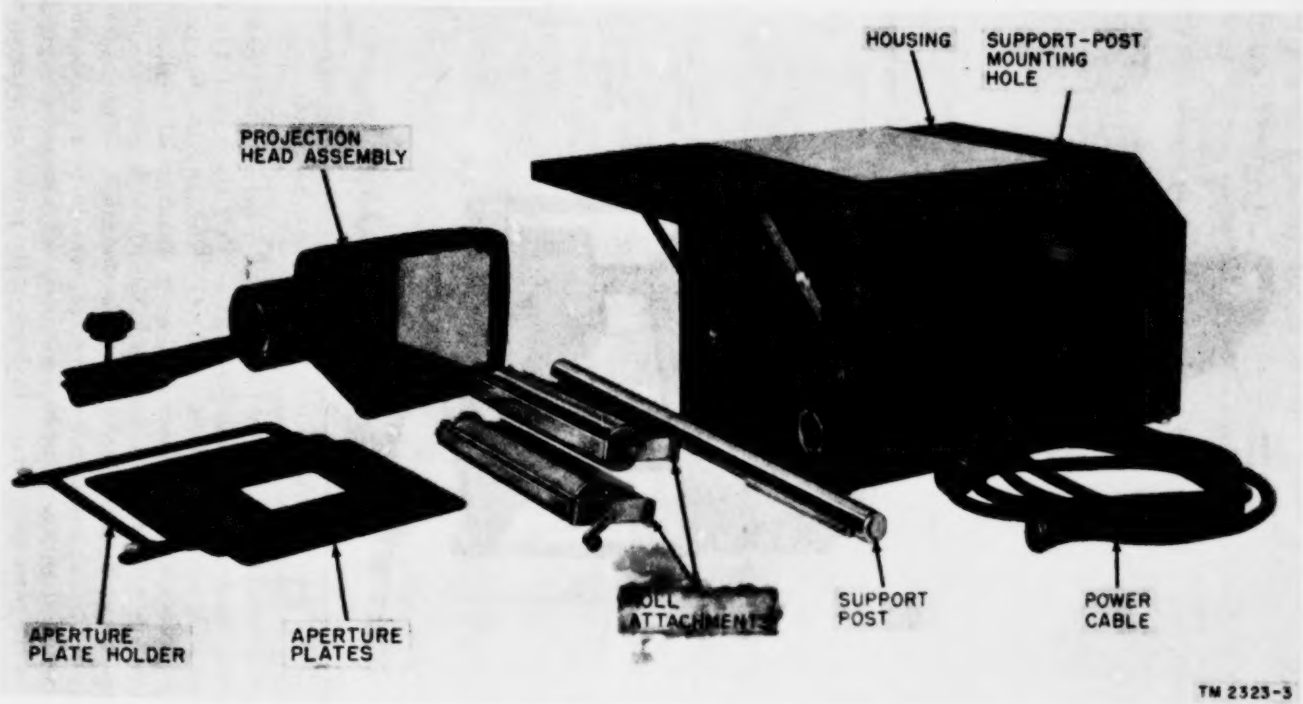
HOUSING
SUPPORT-POST MOUNTING HOLE
PROJECTION HEAD ASSEMBLY
APERTURE PLATE HOLDER
APERTURE PLATES
ROLL ATTACHMENTS
SUPPORT POST
POWER CABLE
TM 2323-3

Figure 3. Projector PH-637/PFP, component parts (lens cap not shown).

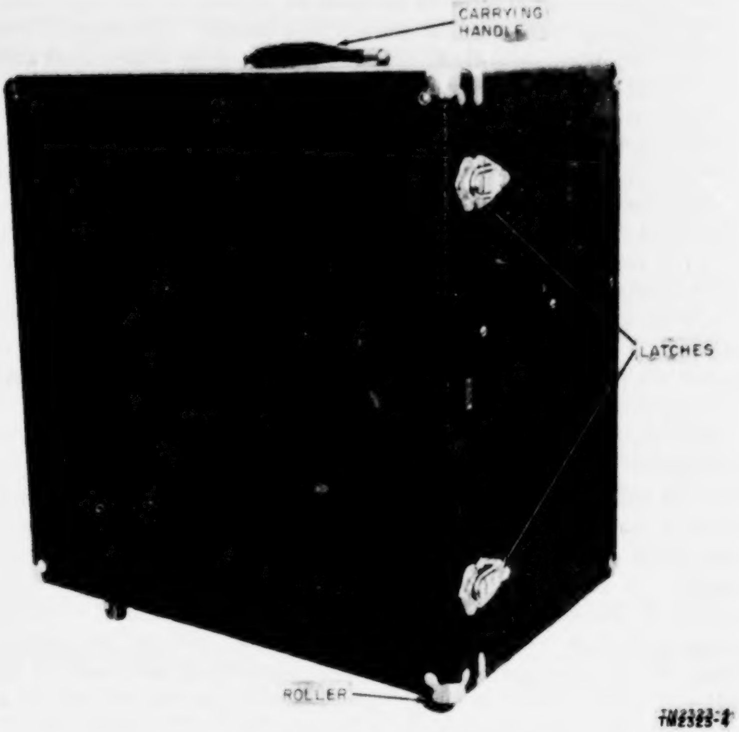

Figure 4. Projector PH–637(*)/PFP, case.

of the housing is a groove that holds a grease pencil used for marking cellophane or plastic held on the stage. On the right side of the housing next to the support-post hole is a clamping knob used to lock the post in position. The housing contains an optical system composed of the reflector, projection lamp, glass condenser lens, rear surface mirror, Fresnel condenser lens, and glass cover of the projection stage. The housing of the PH–637A/PFP also contains a cellophane roll attachment (*d* below).

b. Head-Support Post and Projection Head Assembly.

(1) *Head-support post.* The head-support post is made of stainless steel and has a rack secured to the upper end by three screws. The post fits through a hole in the top of the housing (*a* above), and a notch at the bottom of the post fits over a locating pin on a plug at the bottom of the housing.

(2) *Projection head assembly.* The projection head assembly consists of a front surface-mirror housing, lens, and support arm. The mirror housing is a black, crackle-finish, aluminum casting that contains the mirror and a window.

An elevation screw at the back of the mirror housing is used to adjust the vertical angle of the mirror. The support arm is a black, crackle-finish, aluminum casting with a split tube at one end and a split ring at the other end. The tube fits over the support post, and a pinion in the tube engages the rack on the post. The mirror housing rests on the split ring and is held in place by three screws. A 14-inch focal length lens fits into the bottom of the ring and is secured in position by a locking screw that extends through both sides of the split ring. A lens cap is provided to protect the exposed lens element.

c. Power Cord. A 15-foot power cord with a male plug connector at one end and a female plug connector at the other end is used to attach the projector to a 115- to 120-volt, 60-cycle, alternating-current (ac) power supply.

d. Cellophane Roll Attachment. The roll attachment consists of two parts: a supply unit and a take-up unit. The take-up unit of the PH-637/PFP includes a cutoff blade. Each unit has a rotatable pivot at one end and a stationary pivot at the other end. The rotatable pivot on each unit is spring-mounted and attached to a crank handle. A roll of cellophane or plastic is held in position by the pivots on the supply unit, and the material is unwound over the projection stage and attached to a cardboard roll on the take-up unit. When a section of cellophane or plastic has been used on the PH-637/PFP, it may be either wound on the take-up roll for re-use or ripped off over the cutoff blade for disposal. (When the writing or drawing has been made with a grease pencil it may be wiped off with a soft cloth and the cellophane may be used again.) For the PH-637/PFP, the roll attachment is provided with captive screws by which it can be attached to the sides of the housing. For the PH-637A/PFP, the attachment is built into the housing; the supply unit is at the front and the take-up unit at the rear.

e. Aperture Plate Holder and Aperture Plates.

(1) *Aperture plate holder.* The aperture plate holder is a black, crackle-finish, metal plate with a 9⅝-inch square opening that fits over the projection stage. The plate is held in place at the front of the housing by two captive screws. Corner stops on the plate are used to position various aperture plates as required.

(2) *Aperture plates.* Three aperture plates are furnished with each projector for the masking of transparencies. One has an opening of 8$\frac{11}{16}$ by 6$\frac{11}{16}$ inches, one an opening of 4$\frac{11}{16}$ by 6⅝ inches, and the other an opening of 3$\frac{11}{16}$ by 4⅝ inches. Each plate is 10 inches square. In addition, a plate with a 7$\frac{11}{16}$- by 9$\frac{11}{16}$-inch opening is furnished with the PH-637A/PFP.

f. Carrying Case. The carrying case is a square, wooden, leatherette-covered box with reinforced metal corners. A hinged cover opens at one side; there is a sturdy, leather-covered handle at the top; and the bottom rests on rollers. Inside the case are compartments that hold all components of the projector. The head-support post is held in the cover by wooden locking strips. The housing, projection head assembly, projection lamps, aperture plate holder, aperture plates, power cable, roll attachment (PH-637/PFP only), and cellophane or plastic roll are packed in compartments in the body of the case.

g. Stand. The stand (fig. 2) is designed to support the projector so that the writing surface is 30 inches above the floor (or ground), and is suitable for operation while the operator is sitting. The stand is made of aluminum and steel and has a top frame into which the main projector housing fits. A shelf that holds four compartments for copy storage is riveted to the bottom of the stand. The two front legs are provided with leveling screws. The stand is provided only with some procurements of the PH-637A/PFP.

6. Technical Characteristics

Type	Overhead, transparency.
Projection lamp	500-watt; PH-637/PFP only. 1,000-watt; PH-637A/PFP only.
Projected image	From 32 by 32 inches at 4 feet to 102 by 102 inches at 14 feet (using 10- by 10-inch aperture).
Blower motor	115-volt, 60-cycle, 3,050 revolutions per minute.
Power supply	115- to 120-volt, 60-cycle ac.
Projection lens	14-inch effective focal length.
Lumen output of lamps when used with projector.	500 watts, 900 lumens. 1,000 watts, 1,200 lumens.

7. Additional Equipment Required

To project material satisfactorily, a projection screen is required. Any type of beaded or semimatte screen may be used. A flat, light-colored wall surface will give fair results if no screen is available.

8. Packaging and Packing Data

a. Domestic Shipment. The components of Projector PH-637(*)/PFP (less stand) are placed within their designated compartments in the carrying case (fig. 5). The voids within the case are packed thoroughly with neutral cellulose wadding to prevent movement of the parts. The cover of the carrying case is closed and secured with its two fastenings. The carrying case then is cushioned at each corner and at the top and bottom with fiberboard inserts and is placed within

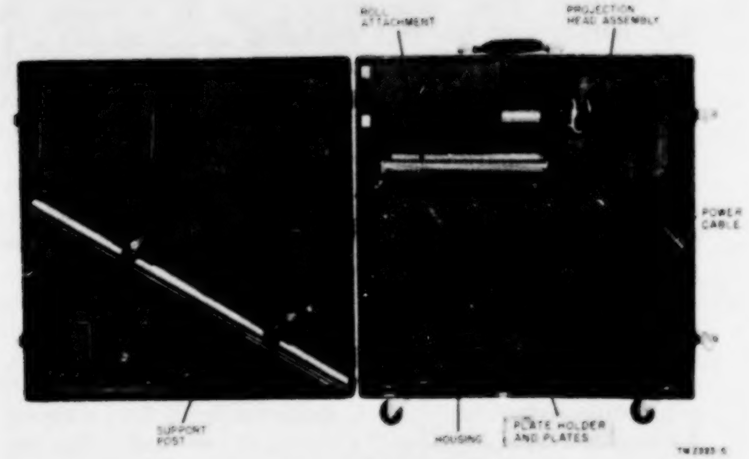

Figure 5. Projector PH-637/PFP, case open.

a corrugated fiberboard box. The entire box closure is sealed with gummed Kraft tape.

b. Export Shipment. Projector PH-637(*)/PFP is packaged as described above except that a desiccant and a humidity indicator are included within the corrugated fiberboard box. Next, it is wrapped in a moisture-vaporproof barrier and heat sealed. Then, packaged equipment is placed within a second waterproof carton sealed with waterproof tape. This second carton is placed within a water-greaseproof lined wooden shipping container. The lining is sealed with waterproof tape and the wooden shipping container is nailed shut. The shipping container is reinforced further by nailing two ¾-inch metal straps about 8 inches from each end.

9. Differences in Models

The differences between Projectors PH-637/PFP and PH-637A/PFP are as follows—

a. Top of Projector Housing.

(1) The top of the PH-637A/PFP is a cover that contains a 10- by 10-inch opening through which the glass top of the projection stage is visible. Aperture plates can be positioned over the opening in the cover. Behind the opening is an adjustable copy-holding device which may be adjusted to hold different sizes of copying material. It also holds in position the aperture plate holder. The projector cover is hinged at the rear and, when raised, is held at a 45° angle by a support arm. The roll attachment (par. 5*d*) and the rear surface-mirror adjusting screws are accessible when the

cover is raised (fig. 27). When the cover is lowered, it provides an arm rest at the front of the housing.

(2) The PH-637/PFP is not supplied with a top cover. There is a collapsible shelf at the front of the housing (par. 5*a*), and the roll attachment is screwed to the sides of the housing (par. 5*d*). The front shelf and the pencil-groove section must be removed to reach the rear surface-mirror adjusting screws (fig. 26).

b. Bottom of Projector Housing (figs. 29 and 30). The bottom of the housing of the PH-637A/PFP contains a duct that directs air from the blower towards the projection lamp. Above the duct near the condenser lens is a channel in which a heat-absorbing filter may be mounted. (No heat-absorbing filter is supplied with the projector.) The PH-637/PFP contains neither the duct nor the channel.

c. Support-Post Locating Plug Locking Screw (figs. 27 and 29). In the PH-637/PFP, the support-post locating plug locking screw is reached from inside the projector housing. The side door of the housing must be opened to reach the screw, which has a hexagonal head. In the PH-637A/PFP, the locking screw is located on the outside of the housing below the support-post clamping knob. The screw has an Allen head.

d. Miscellaneous. Five 1,000-watt projection lamps are provided with the PH-637A/PFP; one 500-watt lamp is provided with the PH-637/PFP. Some procurements of the PH-637A/PFP are supplied with a stand for the projector and with five packages of lens tissue.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

10. Uncrating, Unpacking, and Checking
(figs. 5 and 6)

a. Be very careful when uncrating and unpacking the equipment. Avoid thrusting tools into the interior of the shipping container. Do not damage the packaging materials any more than is absolutely necessary to remove the equipment; these materials may be required for future packaging. Stow the interior packaging materials within the wooden shipping container. When uncrating and unpacking the equipment, follow the procedure given in (1) through (10) below:

(1) Unpack the equipment in a location where it will not be exposed to dust, dirt, or excessive moisture.

(2) Cut the metal wires with a suitable cutting tool, or twist them with pliers until the straps crystallize and break.

(3) Remove nails from the top of the shipping container with a nail puller.

(4) Cut the tape and seals of the case liner so that the waterproof paper will be damaged as little as possible.

(5) Lift out the packaged equipment from the wooden case.

(6) Cut the tape which seals the top flaps of the outer cartons; be careful not to damage the cartons.

(7) Cut the barrier along the top heat sealed seam and carefully remove the inner carton.

(8) Open the inner carton and remove the fiberboard inserts, desiccant, and humidity indicator.

(9) Lift out the carrying case containing the equipment.

(10) Place all packaging material in the shipping container for use in future repacking.

b. Open the carrying case by unlatching the two fasteners. Thoroughly check all equipment against the shipping documents. Carefully inspect all components for possible damage during shipment. Pay particular attention to the condition of the lenses, mirrors, and reflector.

Note. The uncrating, unpacking, and checking procedure for used or reconditioned equipment will be the same as that followed for new equipment. It is very important to check used equipment for a possible shortage of components. The components of used equipment should also be checked for damage so that any damaged parts can be replaced immediately.

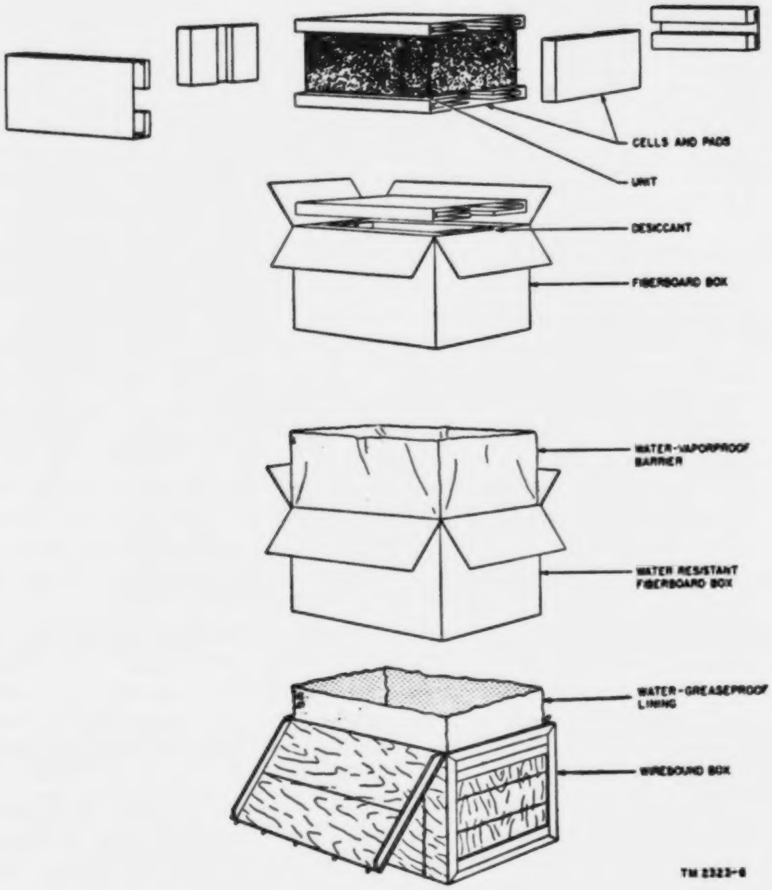
CELLS AND PADS
UNIT
DESICCANT
FIBERBOARD BOX
WATER-VAPORPROOF BARRIER
WATER RESISTANT FIBERBOARD BOX
WATER-GREASEPROOF LINING
WIREBOUND BOX
TM 2323-6

Figure 6. Packaging diagram.

11. Installation

a. Place a stand, table, or other sturdy, level support where the projector is to be used (par. 13). The stand furnished with some of the PH-637A/PFP's is approximately 18 inches high and is designed so that the projector can be used while the operator is in a sitting position (par. 5*g*). If the operator is to stand, the stand or table used should be approximately 28 inches high. The projection distance necessary to obtain a specific size screen image is indicated in the following table.

Distance from screen (ft)	Size of screen image for 10- by 10-inch aperture (in.)	Distance from screen (ft)	Size of screen image for 10- by 10-inch aperture (in.)
4	32 x 32	10	80 x 80
6	48 x 48	12	96 x 96
8	64 x 64	14	102 x 102

b. Open the carrying case, and remove the projector housing from the bottom compartment. Set the housing on the support (*a* above) so that the slanted top edge is away from the projection screen.

c. Loosen the head-support post clamping knob, and insert the support post in the hole on top of the housing, with the notched end down and with the rack on the other end of the post pointing towards the rear. Slide the post down until the notch fits over the locating pin mounted on a plug at the bottom of the housing. On the PH-637/PFP, the plug is visible when the door in the left-hand side of the housing is opened. On the PH-637A/PFP the plug is visible when the rear door is open. If the post has been inserted properly, it cannot be rotated about its axis. Tighten the support-post clamping knob.

d. Remove the projection head assembly from its compartment in the carrying case. Hold it carefully, with the head upright, and slide the tube at the end of the support arm over the head support post (rack and pinion to the rear) until the pinion in the tube engages the rack on the post. Then turn the focusing knob counterclockwise until the head assembly has moved down 1 or 2 inches.

Caution: The head assembly and the support post have been factory-adjusted so that the projectoin lens is centered with reference to the optical system. Do not push the head to the side, because the adjustment may be disturbed.

e. Open the rear door of the housing by loosening the captive screw that holds the door closed. Then raise the latch that holds the lamp house door in place, and lower the door. The lamp socket now may be reached. Remove the projection lamp from its container. Set the base of the lamp in the socket so that the wide ear on the base fits into the wide slot in the socket. Press *gently* downward on the lamp until both ears are below the rim of the socket. Then turn the lamp 90° clockwise so that it is locked in place (fig. 7). Place the lamp cap, attached to the top of the lamp house by a beaded chain, over the lamp so that the cutout in the cap faces the condenser lens in the rear of the housing. Swing the lamp house door up, and lower the latch so that the door is locked in the closed position. Close the rear door of the housing, and tighten the captive screw to hold the door shut.

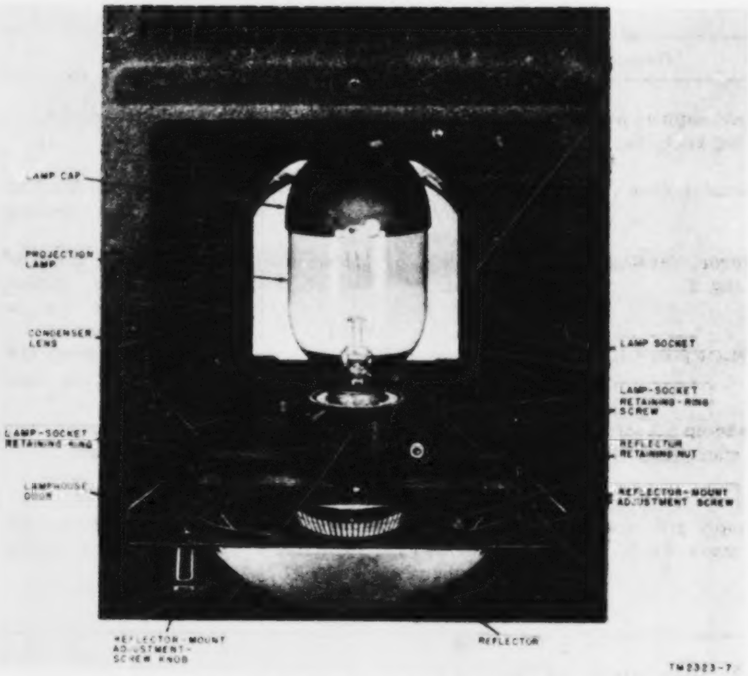
LAMP CAP
PROJECTION LAMP
CONDENSER LENS
LAMP-SOCKET RETAINING RING
LAMPHOUSE DOOR
LAMP SOCKET
LAMP-SOCKET RETAINING-RING SCREW
REFLECTOR RETAINING NUT
REFLECTOR-MOUNT ADJUSTMENT SCREW
REFLECTOR-MOUNT ADJUSTMENT-SCREW KNOB
REFLECTOR
TM2323-7

Figure 7. Projection lamp installed.

f. For the PH–637/PFP, raise the shelf at the front of the housing until it snaps into the horizontal position. For both the PH–637/PFP and the PH–637A/PFP, raise the shelf on the left-hand side of the housing until the shelf support swings out to hold the shelf in place.

g. If the cellophane material is needed for projection purposes on the PH–637/PFP, secure the roll attachments to the housing with the captive screws provided; locate the take-up unit on the left side of the housing and the supply unit on the right side (par. 16).

h. Plug the female connector on the end of the power cable into the receptacle connector on the front of the projector housing, and plug the male connector into a 115- to 120-volt, 60-cycle, ac power source.

Section II. OPERATION UNDER USUAL CONDITIONS

12. Controls

This paragraph describes, locates, and furnishes the operator with all the information pertaining to the various controls for proper operation of the equipment. Do not attempt the operation of this equipment until the use of all operating controls is understood fully.

Control	Location	Function
Head-support post locking knob (fig. 27).	Right-hand side of projector housing near support post.	Locks post in position.
Focusing knob (fig. 2)	On split tube at end of projection head support arm.	Racks projection head up or down for focusing purposes.
Mirror elevation knob (fig. 2).	On back of projection head.	Varies vertical angle of front surface mirror; moves image up or down on screen.
ON-OFF switch (fig. 2)	On front of housing	Turns projector power ON or OFF; controls lamp and blower.
Take-up roll attachment crank (figs. 1 and 2).	On rear of housing (PH-637A/PFP); left side of housing (PH-637/PFP).	Winds up used cellophane on take-up spool.
Supply roll attachment crank (fig. 2).	On front of housing (PH-637A/PFP); right side of housing (PH-637/PFP).	Rewinds cellophane material back on supply spool.

13. Placement of Projector

(fig. 8)

a. Set the projector, on its support, in front of the audience so that the window in the projection head faces the screen. Exact placement of the projector and the screen depends on the following:

(1) Size of screen image desired (par. 11*a*).
(2) Height of screen.
(3) Height of projector from floor.
(4) Best viewing angle for audience.

b. If the lecturer is to sit at the projector, adjust the height of the screen so that it will be viewed over the projector head. If the lecturer will stand, adjust the position of the screen so that viewing will not be obstructed by either the lecturer or the projector. If a large image is required in a low-ceiling room, adjust the relative positions of the projector and screen for an oblique viewing angle to insure maximum visibility.

14. Operation

After the best possible placement of the projector and screen has been determined, proceed as follows—

a. Remove the lens cap, and throw the ON-OFF switch to the ON position.

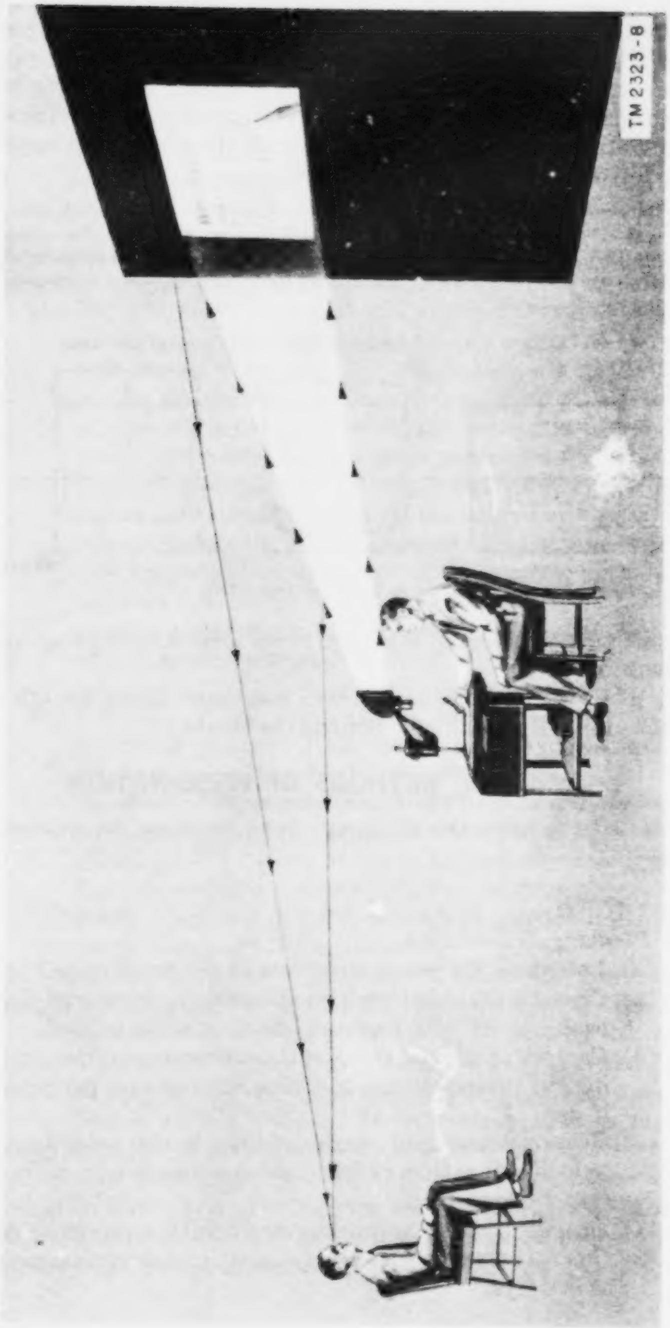

Figure 8. Placement of projector for viewing.

b. Place a sharply marked transparency on the projection stage, and move the projector to the left or right until the image is centered laterally on the screen. Turn the focusing knob until the image on the screen is in focus, and then turn the elevating knob on the back of the projection head until the image is centered vertically on the screen. Now turn the focusing knob again until the image is brought into sharp focus.

Note. As the image is raised above a certain postion on the screen, the picture becomes wider at the top than at the bottom (fig. 9). This distortion (keystoning) is not ordinarily objectionable, but it may be corrected by using a screen than can be tilted forward at the top or by raising the end of the projector nearest the screen.

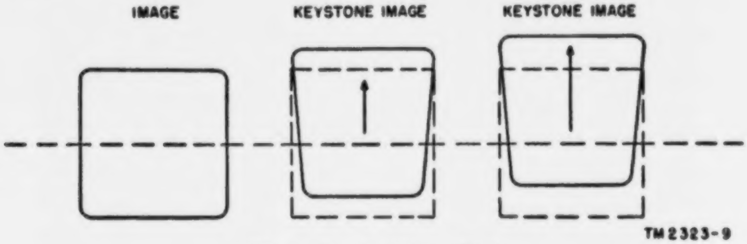

Figure 9. Keystone effect.

c. Present the material as desired in accordance with paragraphs 15 through 25.

d. When the presentation has been completed, throw the ON-OFF switch to the OFF position. Replace the lens cap.

Section III. METHODS OF PRESENTATION

Note. Refer to paragraphs 26 through 31 for details on the preparation of transparencies.

15. General

a. Planning Presentation.
- (1) Determine the prime objectives of the presentation.
- (2) Consider the objectives when determining what type of transparencies are to be used and how they are to be used.
- (3) Carefully plan and organize the entire presentation. In timing the presentation, allow time for audience participation, if desired.
- (4) Rehearse a sufficient number of times so that brief notes may be used rather than verbatim commentary.

b. Types of Transparency.
- (1) Images of one or more colors on single transparent sheets.
- (2) Composites made up of two or more transparencies mounted as overlays.

(3) Special animated plastic devices.

(4) Transparencies on which material is written or drawn freehand, either during the presentation or in advance.

(5) Transparencies produced by the photochemical and lithographic processes.

16. Cellophane or Plastic Sheets

(fig. 10)

a. Roll Attachment. The roll attachment is built into the housing of the PH–637A/PFP; it must be attached to the PH–637/PFP.

(1) *PH–637/PFP.* Attach the take-up unit to the left side of the projector housing by screwing the two captive screws on the unit into the screw holes on the upper left side of the housing so that the crank handle is toward the front. Attach the supply unit to the right side of the housing in the same way. Mount the roll of cellophane or plastic on the supply unit by pulling outward on the supply unit crank handle and inserting the roll so that it is held at each end by a pivot. Then release the handle. Draw the sheet of plastic or cellophane over the projection stage, and either attach it to the take-up roll with Scotch tape or slip it between the frame of the unit and the cutoff blade. When the crank is turned counterclockwise the cellophane material is wound on the take-up roll.

(2) *PH–637A/PFP.* Raise the top cover until it is retained in the raised position. One end of the roll of cellophane or plastic has a rectangular insert. Slip this end over the driving pivot of the supply unit at the front of the housing, and push against the pivot until the other end of the roll can be placed over the pivot at the other end of the supply unit. Pull the end of the plastic or cellophane sheet over the projection stage and attach it to the take-up roll (in the rear of the housing) with Scotch tape.

b. Using Cellophane or Plastic Sheets. Face the audience, and mark on the cellophane or plastic with a grease pencil. The weight of the lines written or drawn may be varied by varying the pressure applied to the pencil. A fountain pen filled with transparent, water-soluble ink may be used to write on clear plastic, but it is not satisfactory for use with cellophane. If information is to be presented several times, or if information to be entered on the transparency requires considerable time for recording, partially complete the transparency on a cut sheet of cellophane or plastic. Then slip the sheet under the transparent material stretched across the projection stage (fig. 10) and write or draw in register with the transparency under-

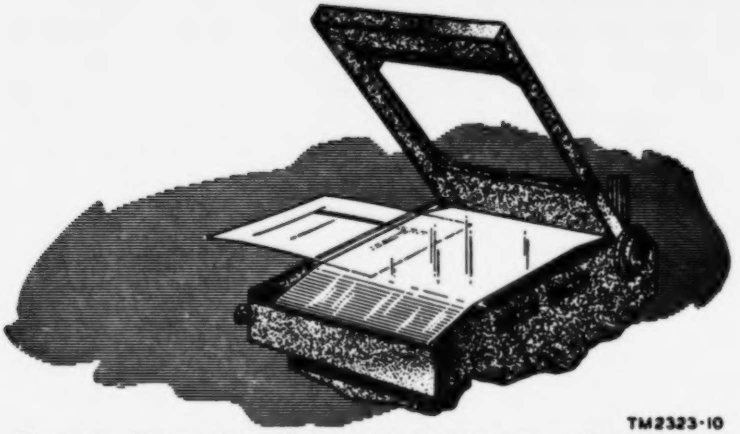
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Figure 10. Using roll attachment with partially completed transparency (PH-637A/PFP).

neath to complete the presentation. In this way, the original partial transparency may be re-used as often as desired.

17. Carbon-Coated Film

Use a sharp pencil or a stylus on the emulsion side of carbon-backed film to obtain brilliant white lines against a dark background on the screen. Lay the film directly on the projection stage, or mask it in one of the following ways:

a. Mount the film to a single mask with masking tape.

b. Insert the film between the two parts of a double cardboard cutout mask.

c. Insert the film between a sheet of clear plastic and a single mask. In this case, be sure that the plastic sheet serves as backing and that the emulsion side of the film is exposed for writing.

18. Overlays

(fig. 11)

Use a series of overlays to show the construction or breakdown of such things as business forms, electronic circuits, biological structures, logistic concepts, and machinery. Make up, number, and assemble the overlays as indicated in paragraph 31*d*.

19. Cutouts

Cut out symbols or disks of colored plastic and use them to spot locations. Change or maneuver the locations during the demonstration by using the rubber-eraser end of a pencil to move the symbols or disks from one position to another. Symbols may represent buildings, vehicles, traffic markings, elements of terrain, guns, bursts, personnel, or other figures and objects.

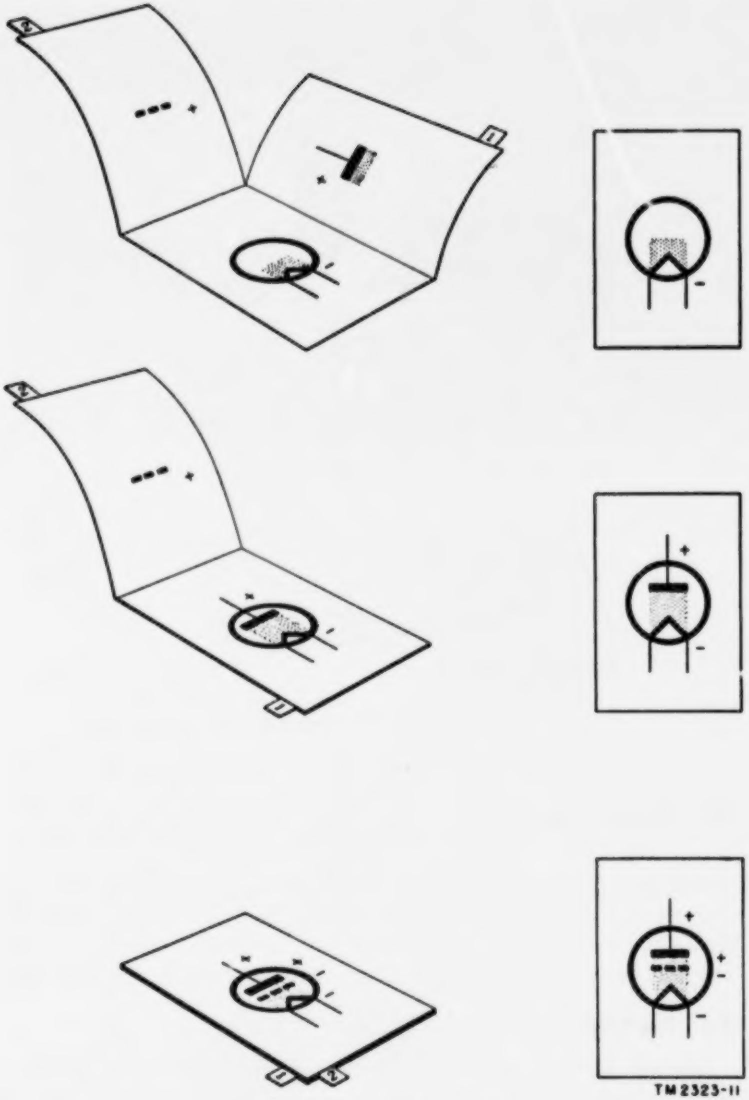


Figure 11. Use of overlays.

20. Bar Graphs

(fig. 12)

Convert statistical information into graphic form by using colored or patterned adhesive sheeting or colored plastic tape and a pen or a grease pencil to construct bar graphs. Establish basic grid lines by using the pencil or ink and a plastic rule. Fill in the bar lines by using the pencil or ink and a plastic rule. Fill in the bar values with the plastic tape or adhesive sheeting cut to the required lengths with a razor blade.

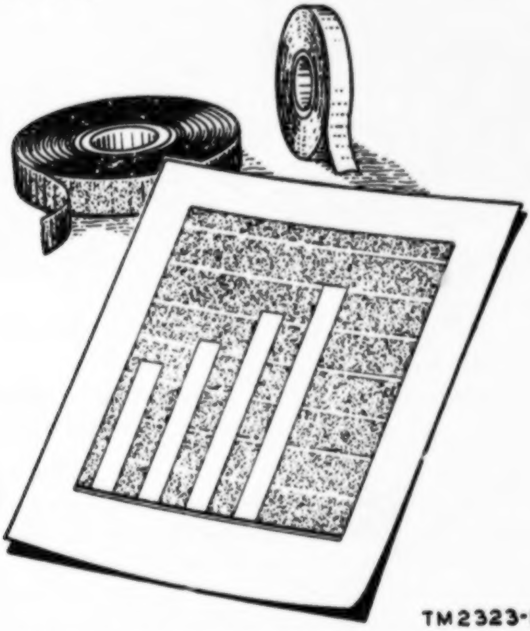


Figure 12. Bar graph made with adhesive sheeting.

21. Flannel Board

(fig. 13)

Mount a gray-felt or flannel-covered board in place of the projection screen. Project a basic image on the board, and add the required flannel-board symbols. By this method, it is not necessary to superimpose elements on the flannel, and the added symbols are spotlighted.

22. Blackboard

Make a partial drawing on carbon-coated film on the projection stage. Project the partial drawing on a blackboard, and then complete it on the blackboard in chalk. In this way, many variations of the projected basic construction can be worked out without destroying the original drawing.

23. Fluids

(fig. 14)

To demonstrate the physical properties or chemical reactions of

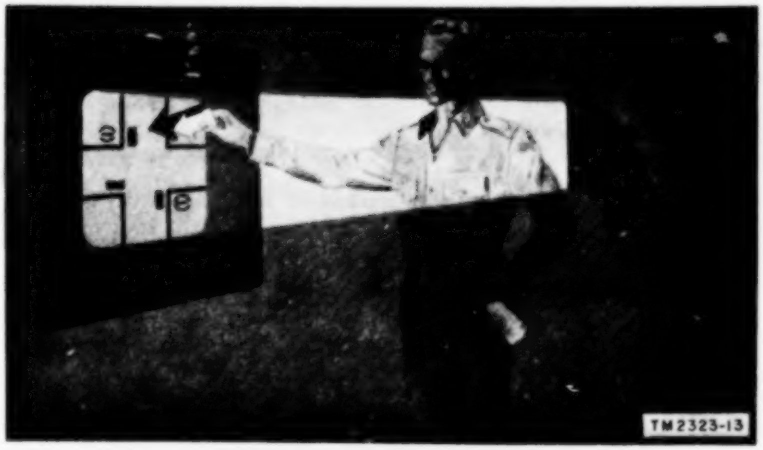


Figure 13. Use of flannel board with projector.

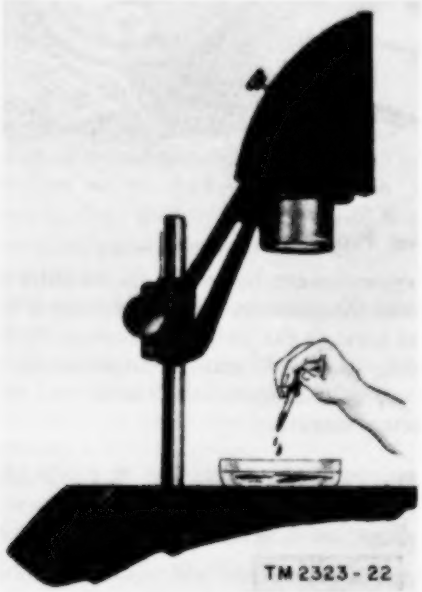


Figure 14. Demonstration of reaction in a fluid.

fluids or solutions, use a Petri dish as a receptacle. Place the dish on the projection stage, and pour in the fluid or mix the desired solution. The projector now can be focused to show reactions at the bottom of the dish, at the top of the dish, or at intermediate planes.

This type of presentation is particularly effective in showing corrosion, lubrication principles, electrolytic disassociation of solutions, and similar reactions.

24. Animated Devices

(fig. 15)

Construct transparent plastic models or mock-ups with movable parts. Any such device should be built to fit within the 10- by 10-inch dimensions of the projection stage. The projector can be refocused as necessary to bring various elements of the device into sharp focus. Typical of the plastic animated devices that can be constructed are measuring scales, slide rules, electric meters, hand tools, basic mechanisms, atomic models, biological structures, and floral shapes.

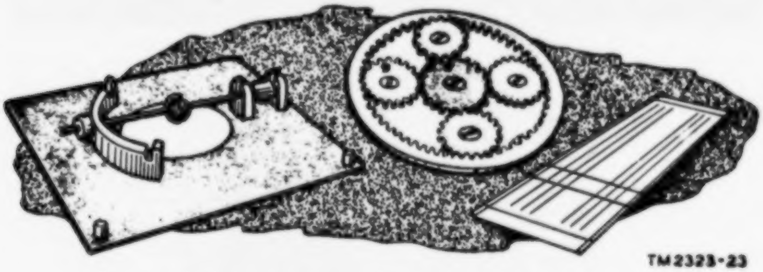


Figure 15. Animated devices made for use with projector.

25. Use of Two Projectors

Two or more projectors can be used in the solution of tactical problems involving team competition. Give each team a copy of the same transparency, and arrange the projection screens so that they are not visible to competing teams. If translucent screens are used, umpires or observers can view the competition from behind the screens while the screens are being marked.

Section IV. PREPARATION OF TRANSPARENCIES

26. Materials Used in Preparing Transparencies

a. Kit. A Signal Corps visual aid illustration kit (Sig C stock No. 8P20-2023), which may be ordered through supply channels, contains the following items:

(1) 24 mounts.
(2) 100 sheets of clear acetate.
(3) 6 film sheets.

(4) 1 roll of mounting tape.
(5) 2 grease pencils.
(6) 3 leads for grease pencils.
(7) 1 pad for tracing paper.
(8) 24 gummed labels.
(9) 1 box of absorbent cotton.
(10) 1 camel's-hair brush.
(11) 4 sheets of acetate with grids.
(12) 1 ruling pen.
(13) 1 drawing board.
(14) 1 each bottle of ink: black, blue, green, yellow, orange, red, and brown.
(15) 1 bottle of ink solvent.
(16) 1 speedball penpoint.
(17) 1 pen holder for speedball penpoint.
(18) 10 each sheets of colored acetate: red, green, and blue.
(19) 1 triangle (30°/60°).
(20) 1 triangle (45°).
(21) 1 lettering guide.
(22) 1 pen for lettering guide.
(23) 1 T-square.
(24) 1 quill.

b. Supplementary Materials. Additional materials that may be used in the preparation of transparencies by direct and photochemical means are as follows:

(1) Red tracing carbon, used to transfer hand-drawn or typed impressions to cellophane or clear acetate.
(2) Cotton tips.
(3) Plastic spray, used to coat inked transparencies with a protective covering.
(4) Transparent sheets, which are adhesive-backed. These sheets come in a variety of symbols, patterns, and colors.
(5) Stylus, used to write on carbon-coated film, tracing carbon, and transparent adhesive sheets.
(6) Taped tabs, which are adhesive-coated. These are used to indicate the sequence of a series of overlays.
(7) Pumice or talc, rubbed on clear acetate to make the acetate a better surface for writing in ink.
(8) Ammonium hydroxide, used in dry ammonia development.
(9) Diazo-coated cellulose acetate film.
(10) Reflex paper, an autopositive, translucent paper used to develop positives under room-light conditions.
(11) Autopositive film.
(12) Ultraviolet-light filter, a yellow or orange sheeting used to filter ultraviolet light in reflex printing.

(13) Photographic developer, used to develop autopositive paper or film.

(14) Acetic acid. One part of 28-percent acetic acid is added to 20 parts of water to make a photographic short stop.

(15) Photographic fixer, a hypo fixing bath for paper and film.

(16) Transparentizing solution, used to improve the transparency of tracings and autopositive paper.

(17) Photographic trays. Twelve- by 14-inch trays are required to process 8½- by 11-inch paper or film in photographic chemicals.

Note. The items in (8) through (17) above are for use only in an authorized photographic laboratory.

27. Direct Methods

a. Grease (Wax-Base) Pencil. Apply the grease pencil directly to the cellophane or plastic sheet (par. 16*b*).

b. Carbon Tracing Sheets. Trace, draw, or type on the back of carbon tracing sheets that have been placed in contact with clear plastic or cellophane. Red carbon paper is recommended, because it will produce the sharpest projected image.

c. Transparent Inks (fig. 16). Apply water-soluble, transparent, colored inks to clear plastic (*not to cellophane*) in one of the following ways:

(1) Apply the ink with an ordinary fountain pen, but use a somewhat slower motion than is normal for writing on paper.

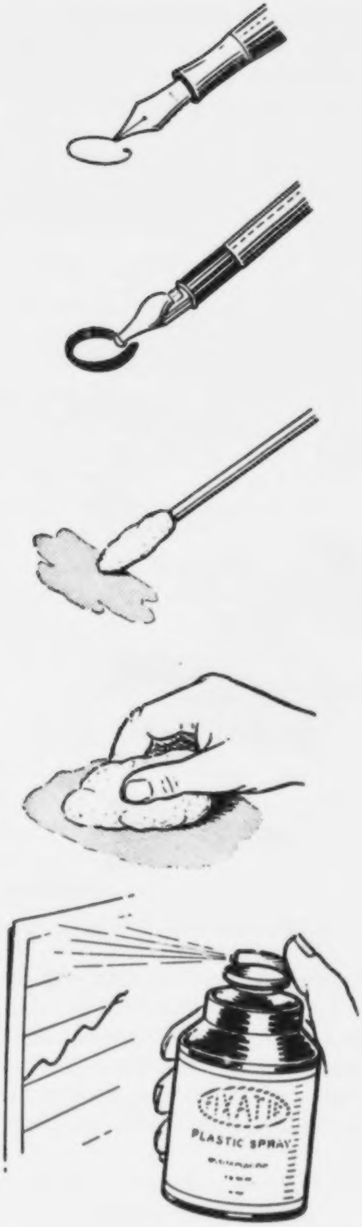
(2) Use a speedball pen to draw broad lines or to fill in relatively small areas. When filling in, use a rotary motion, and work from the center of the area outward to insure even distribution of color.

(3) Twirl cotton on the end of a slender wooden stick, and use the tip as a brush to fill in large areas. Move the cotton tip back and forth in parallel strokes without lifting it from the plastic. A sable brush may be used for the same purpose. To obtain light, even tones, apply the ink liberally. Then, as it dries, rub the colored area vigorously with a wad of cotton. Trim the edges of the area by wiping them clean with a damp cloth.

Note. Coat the surface of the completed transparency with a light film of plastic spray. Apply the spray from a distance sufficient to insure that the surface will not be wetted to a milky density.

d. Adhesive Patterns (fig. 17). Apply an adhesive pattern as follows:

(1) Cut out a section of the adhesive sheet so that it roughly matches the area to be covered on the completed transparency.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PLASTIC SPRAY

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Figure 16. Use of ink in preparation of transparencies.

(2) Strip the protective backing from the cutout.

(3) Press one edge of the adhesive cutout to the plastic sheet, and smooth the remainder into place. Be sure to avoid wrinkles or bubbles. Use additional pressure to insure firm adhesion.

(4) Trim the rough edges of the cutout with the chisel end of a stylus, and remove the scraps. Use the stylus point, as necessary, to inscribe captions or to make additional line drawings on the adhesive cutout.

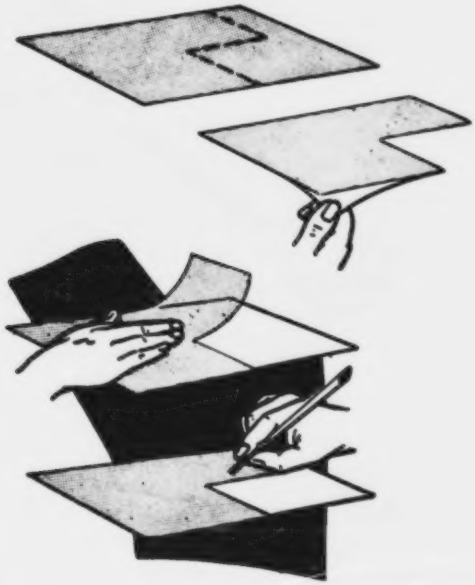
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Figure 17. Use of adhesive patterns in preparation of transparencies.

e. Tracing on Transparency. Tracings may be made directly on the transparency to be used for projection or on translucent cloth or paper to be used as a master in the reproduction of transparencies. These tracings are made directly from the original.

(1) Attach a transparent (or translucent) sheet to the original by securing them together with masking tape at the upper edge.

(2) Smooth the transparency down with the hand or, if a drawing board is used, with a T-square. Then fasten the lower edges together with masking tape.

(3) Use a tracing pencil to trace the original on the transparency. Then go over the tracing with ink or soft lead pencil.

Caution: Make registration cross marks at the four corners of the original before attaching it for tracing. Trace the cross marks on the transparency when the drawing is transferred. The registration marks are particularly important if partial tracings are to be made for the preparation of overlays.

Note. **The procedures covered in paragraphs 28 through 30 are used only in an authorized photographic laboratory.**

28. Dry Ammonia Printing

a. General. Images drawn on tracing paper or photocopied on translucent paper or film can be transferred to diazo-coated cellulose acetate foil. Diazo-coated foils can be handled under ordinary room lighting conditions. The following two procedures are required in making transparent prints by the dry ammonia method:

(1) Contact exposure to a strong source of light, preferably ultraviolet.

(2) Development of the exposed foil in contact with ammonia vapor.

b. Printing Procedure Using Machine. Dry ammonia (Ozalid) printing machines are motorized to convey diazo-coated materials through exposure and development sections at controlled speeds. Ozalid machines are designed to duplicate translucent originals rapidly on diazo-coated paper and may also be used for printing translucent tracings or other translucent masters on sensitive foil. Proceed as follows when using an ozalid machine—

(1) Place the original translucent tracing or photocopy on a sheet of ozalid foil of the selected color so that the emulsion side of the foil is in contact with the original.

(2) Hold the original material and the foil in contact, and insert them into the light section of the machine so that the light will pass first through the translucent original.

(3) Remove the pair from the light section of the machine, lay the original aside, and place the exposed foil in a fold of absorbent paper (newspaper, for example). Then pass the folded paper containing the foil through the ammonia chamber of the machine, with the emulsion side facing the ammonia vapor in the chamber. Pass the folded paper, with the foil, through the ammonia chamber again and again, if necessary, until the image on the foil is developed to full density.

c. Printing by Hand. If transparencies must be produced without an automatic printing machine, proceed as follows:

(1) *Exposure.*

(*a*) Place the original translucent copy in contact with a sheet of Ozalid foil of the desired color, and hold them together between two glass plates. The emulsion side of the foil should face the original.

(*b*) Expose them to a strong source of light so that the light passes first through the original copy. The light source may be sunlight, a rigging of sunlamps, or an ultraviolet printer. Determine the correct exposure time by exposing several strips of foil for varying lengths of time and then developing them ((2) below). If exposure is too short, the foil will develop with a dark background. If exposure is too long, the foil will be clear, but the image will be reduced to faint lines. Correct exposure should be just long enough to clear the background without reducing the strength of the image. If the exposure is well timed, development time will be unimportant, because only the sensitive salts, which have been protected from the light by the original image, will react to the ammonia.

(2) *Development.*

(*a*) Obtain a receptacle, such as a wide-mouthed gallon jar, to serve as an ammonia chamber. Cover the bottom of the jar with a piece of blotter or other absorbent material.

(*b*) Pour a few drops of strong ammonia solution into the jar, and cover the jar with the lid. Ammonia fumes will fill the jar.

(*c*) Curl the exposed foil around its shortest dimension. Then quickly take the lid off the jar, insert the foil, and replace the lid. Now observe the image as it develops within the jar. Remove it when it has developed to full intensity.

29. Reflex Printing

a. General. An illustration on opaque paper or one that has writing on the back can be transferred to Ozalid foil under room-light conditions. The steps involved in the transfer are as follows:

(1) Preparation of a master copy by reproducing the illustration on a translucent sheet.

(2) Transfer of the translucent image to Ozalid foil by contact exposure and dry ammonia development.

b. Exposure.

(1) Place the illustration face up on a printing frame or sheet of plate glass, and place the reflex medium (such as autopositive translucent paper or film) over the illustration, emulsion side down. The emulsion side may be distinguished by its slight coloration and glossy surface. Film is used in preference to paper when delicate tones are required. Glossy photographs, for example, are better reflected on film than on paper. Autopositive paper is less expensive than film and

is suitable for line drawings and illustrations that have been screened for printing. The film requires a longer exposure time than the paper.

(2) Place a yellow filter over the reflex medium to filter out the ultraviolet light, and then press the top of the printing frame or another sheet of plate glass down to hold the illustration, reflex medium, and filter sandwiched together.

(3) Expose the illustration. When the illustration is exposed, the light must pass first through the filter and then through the reflex medium, so that it strikes the illustration and is reflected back to the emulsion side of the reflex medium. Determine correct exposure time by exposing test strips of the reflex medium for varying lengths of time. Then develop the strips (*c* below). If exposure is too short, the paper will show a gray background. If exposure is too long, the paper will be clear, but the image will have faded. The projection stage of Projector PH-637(*)/PFP may be used as a source of light for exposure.

c. Development.

(1) Submerge the exposed paper or film in a tray of developing solution. Dektol or D-72 type developers are recommended. The rate of development will be rapid and may be retarded by diluting the stock developing solution with 2 parts of water.

(2) As soon as the image is sharp, transfer the paper or film quickly to a second tray containing a short stop, which can be prepared by adding one part of 28-percent acetic acid to 20 parts of water.

(3) After the paper or film has remained in the short stop for a few seconds, transfer it to a fixing solution. Mix the solution in accordance with the instructions on the container. Leave the print in the fixing bath for several minutes.

(4) Remove the print from the fixing bath, and rinse it thoroughly with water. Then hang it up to dry.

(5) The resultant print is translucent and may be used to reproduce the image on Ozalid foil (par. 28).

30. Multicolored Transparencies and Overlays

a. Ink. Use the methods described in paragraph 27*c* to prepare multicolored transparencies freehand in ink.

b. Tracings in the Preparation of Overlays (fig. 18).

(1) Make one complete tracing of the original (par. 27*e*).

(2) Prepare a separate tracing of each part that is to appear in a different color. Be sure to include register marks on each tracing to insure correct alinement.

(3) Consider each tracing as a color separation master, and print each on the appropriate color Ozalid foil (par. 28*b*).

(4) Mount the foil transparencies as overlays (par. 31*d*).

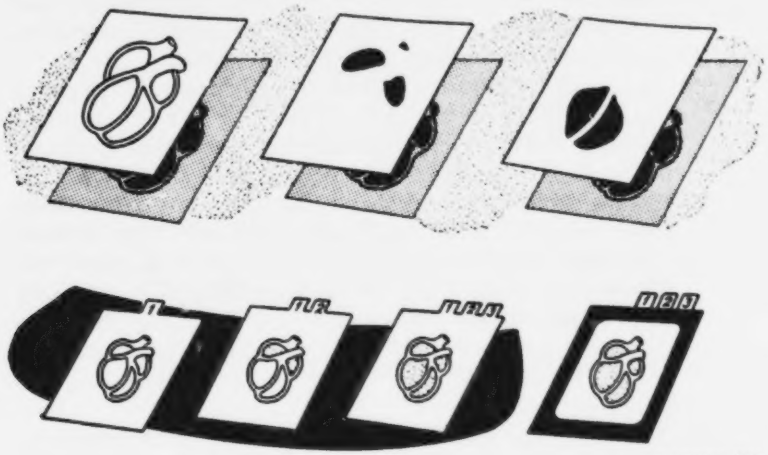

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Figure 18. Preparation of color overlay transparency.

c. Transparent Photographic Negatives and Positives.

(1) A three-color transparency may be obtained by using a photographic positive and a photographic negative transparency of the same image (fig. 19).

(*a*) Duplicate the negative on Ozalid foil of a particular color.

(*b*) Duplicate the positive on Ozalid foil of another color.

(*c*) Superimpose the two colored transparencies in register. The result will be a single transparency in two pure colors with graduations of the intermediate color.

(2) When the charts or drawings are so complex that tracing is impractical, obtain duplicate positive (or negative) photographic transparencies of the original. Use a razor or other sharp blade to cut out of each transparency the portion that is not to be projected in the color to be used for that particular part. Print each modified transparency on Ozalid foil of a different color, and superimpose the foil copies in register.

(3) Obtain a black-and-white photographic negative of the image to be projected, or duplicate a negative photostat of the image on Ozalid micro-black foil. Modify the clear lines with transparent ink of different colors, as desired. When projected, the clear lines of the transparency will show in color.

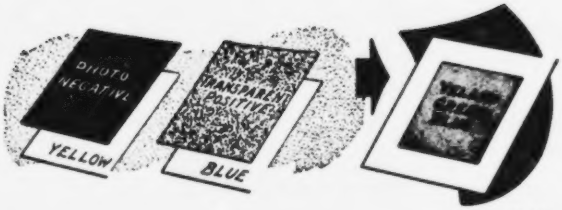

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Figure 19. Preparation of three-color transparency from transparent positive and negative.

d. Photographs.

(1) Obtain as many duplicate prints of the illustration as required.

(2) Use white, opaque paint to delete from each photograph the part not to be printed in the color intended for that portion.

(3) Prepare an autopositive, translucent master from each modified photograph (par. 29).

(4) Print each autopositive on a different color Ozalid foil, and then superimpose the transparent prints in register.

e. Sepia Lithofoil Intermediates (fig. 20).

(1) Prepare an autopositive paper or film master from the original illustration.

(2) Use the master to make copies on Ozalid sepia lithofoil. The Ozalid copies will serve as intermediate masters.

(3) Apply Ozalid Intermediate Corrector to those portions of each sepia foil print not required in the color to be used for that print. Leave the corrector on the foil until the sepia disappears from the treated areas (about 1 minute). Then remove excess corrector with a blotter.

(4) Make an Ozalid transparency in the desired color from each modified intermediate master, and superimpose the transparencies in register.

f. The Bruning Method (fig. 21). Simple line drawings and poster-type illustrations can be duplicated in several colors on a single transparency by the *Bruning method.*

(1) Make a tracing of the original, or obtain a translucent master by reflex printing (par. 29).

(2) Place the tracing or translucent master in contact with a sheet of Bruning Copyflex film, and insert them between two glass plates. Then expose them to a strong source of light (sunlight, sunlamps, or ultraviolet printer) so that the light passes first through the master. Use test strips to determine correct exposure time, if necessary.

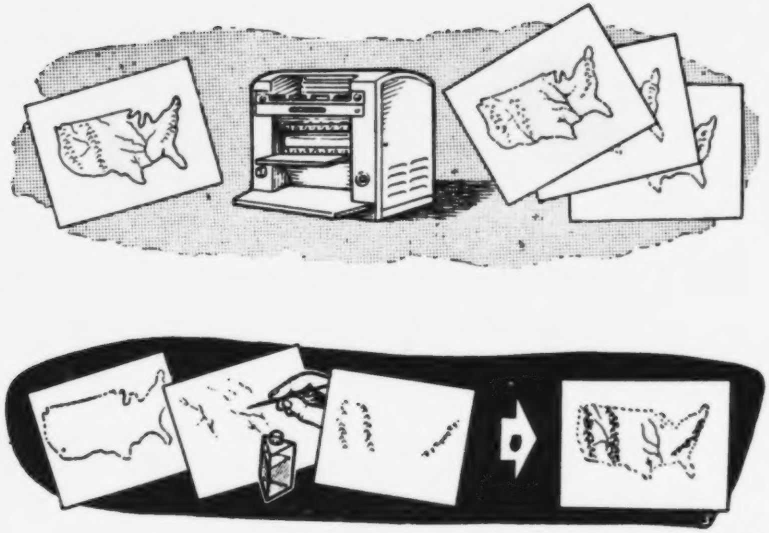

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Figure 20. Preparation of transparency by using sepia lithofoil intermediates.

(3) Remove the original and the master from the plate glass sandwich, and place the exposed film over the master in register.

(4) Apply Bruning developing solution of the desired color to the appropriate areas with a brush or cotton-tipped stick. Use a separate applicator for each color solution.

Note. Dissolve *Bruning* developing salts for the desired colors in water, and place the solutions in labeled bottles.

(5) The unexposed portions of the film will develop in color when painted with the solution. Since exposed portions of this film will not react to the solution, the operator need not be too careful about staying within the area to be colored.

31. Masking and Mounting

a. General. Transparencies may be masked for the following purposes—

(1) For convenience in holding the transparency in position on the projection stage.
(2) To prevent the transparency from curling.
(3) To provide rigidity for vertical filing.
(4) To add a margin for notes and markings.

b. Single-Cell mounts. Center the transparency on the mask and tape it on all four sides. Place the tape so that the edge of the trans-

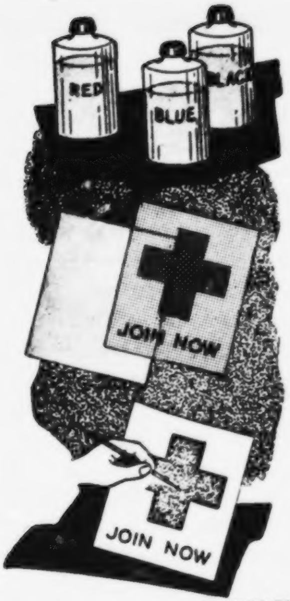

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Figure 21. Preparation of a transparency by the Bruning method.

parency will be covered by about half the width of the tape. Unroll a short length of tape, and attach the free end to one corner of the transparency. Press down with one hand on the tape that has been attached, and with the other hand unroll the tape to the adjacent corner of the transparency. Smooth the tape down with the hand opposite the roll of tape, and then cut the tape with a sharp tool, such as a razor blade. Turn the mount over, and press the tape down on the reverse edge. Tape all four sides of the transparency to the mask in the same way.

c. Temporary Mounts. Construct a temporary mount by taping one edge of a sheet of clear plastic to one edge of the mask. Then insert the material to be projected between the plastic and the mask.

d. Overlays. Mount a series of overlays (cells) on a single mask by taping each cell to the same edge of the mask, by taping the cells alternately to opposite margins, or by taping the cells to succeeding margins in rotation. If necessary, affix a numbered sticker to each cell to indicate proper sequence.

e. Double Cutouts. Insert the transparency between two masks. Then seal the masks together with tape, glue, or mounting tissue.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

32. Arctic Areas

Projector PH-637(*)/PFP is not designed for operation at low temperatures. When the equipment has been stored outdoors or in an unheated shelter where extreme temperatures are encountered, proceed as follows before operating it.

a. Move the equipment into the room in which it is to be operated, and let it remain at room temperature for approximately 6 hours before removing the protective covering. If the cover is removed sooner, water may condense on the equipment and cause permanent damage. Whenever possible, inclose the covered equipment in water-repellent material before transferring it from the cold storage area to room temperature. The water-repellent material over the protective covering should decrease the possibility of water condensing on the equipment.

b. Before operating the equipment, clean and dry the glass window on the projection head and the plate glass cover of the projection stage. Then turn the projection lamp and blower on for 10 or 15 minutes to evaporate any remaining moisture.

33. Cold-Weather Processing

Note. **The information contained in this paragraph is for use only by qualified, photographic laboratory personnel.**

a. General Information.

(1) In processing sensitized materials, use the standard, packaged, Signal Corps specification formulas whenever they are available.

(2) Freezing does not affect the action of processing solutions if they are warmed until the chemicals have redissolved. Jugs of processing solutions should not be filled to more than 80 percent of capacity, because they may crack under pressure when the solutions freeze. Air near the ceiling of a room is usually warmer than air near the floor; therefore, storing processing solutions near the ceiling will help to prevent them from freezing.

(3) Many photographic solutions are prepared in concentrated form to save space and to speed up processing. Most solutions will not be saturated above 40° F. When the temperature falls a few degrees below 40° F., however, marked precipitation usually takes place. Chemicals precipitated out of solutions are inactive, weaken the solutions, and are a nuisance because suspended or floating crystals cause specks or spots on sensitized materials. If the precipitate is re-

moved by filtering, the solution will remain weak. Redissolve the precipitate by warming the solution. *Do not boil it.*

(4) The solubility of hydroquinone decreases rapidly at low temperatures. It usually crystallizes in long fine needles when developers are chilled or stored at temperatures below 40° F. Ethyl, isopropyl, or butyl alcohol may be added to developer up to 10 percent of developer volume to prevent hydroquinone crystallization.

b. Development Using Cold Solutions. At 55° F. or lower, D-72 developer can be used full strength to reduce developing time. However, processing at low temperatures is not recommended because of the length of time required and the hardship imposed on laboratory personnel. All solutions should be warmed to about 68° F.

c. Fixing. The rate of penetration and the reaction time of fixers decrease at low temperatures. At temperatures below 68° F., double the fixing time for every 18° F. decrease.

d. Washing. Washing time must be increased at low temperatures because of the reduced penetration rate and the slower diffusion of chemicals. If prints are washed at 50° F., twice the normal washing time is necessary. At 35° F., four times the normal washing time is required. Prints may be washed for immediate use by immersion, with agitation, for about 2 minutes in each of three or four changes of water at 65° F., but they should be rewashed thoroughly before being stored in permanent files.

e. Finishing Prints. When prints are made under cold or extremely dry conditions, the fixing bath hardener may be reduced to one-half, and sometimes to one-fourth, of the standard concentration.

34. Tropic and Desert Areas

a. If it is necessary to store the printer outdoors in very high temperatures, cover it with a shelter cloth to protect it from dust.

b. Before using the equipment in desert regions, use a soft bristle brush to clean any sand or dust from the projection-head window and the plate glass on the projection stage. Open the door on the left side of the printer and brush dirt and sand from the bottom of the Fresnel condenser lens, the rear surface mirror, and the condenser lens. Open the rear door of the printer and the lamphouse door, and brush dust and dirt from the reflector, the projection lamp, and the rear surface of the condenser lens.

c. Under conditions of high humidity, inspect the equipment for traces of fungus, mold, and metallic corrosion. Remove all traces immediately. Refer to TB SIG 149 for further information on this subject.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE SERVICES

35. Tools and Materials Required for Organizational Maintenance

The following tools and materials are required for organizational maintenance of Projector PH–637(*)/PFP:

Item	*Sig C stock No.*
Cloth, lint-free	6Z1689
Lens cleaner, liquid	8A819
Lens tissue	8A2559
Camel's-hair brush	6Z1372
Screwdriver TL–456/U	6R15211A
Screwdriver, TL–105	6R16410
Wrench, Allen	6R55075–2
Wrench, Allen	6R57400–12
Wrench, open end	6R5507–8.1

Caution: Emery cloth, sandpaper, crocus cloth, or similar abrasive materials must not be used to clean the equipment. Use only the cleaning agents specified.

36. Definition of Preventive Maintenance

Preventive maintenance means making systematic checks and adjustments at regular intervals to keep equipment operating at top efficiency. It is not the same as troubleshooting or repair. The purpose of preventive maintenance is to *prevent* breakdowns and the need for repair. The purpose of troubleshooting and repair is to locate and *correct existing defects.* The importance of preventive maintenance cannot be overemphasized. Failure or inefficient operation of one component of the equipment may cause the failure of the entire unit. It is vitally important, therefore, that operators and repairmen maintain their equipment properly.

37. Preventive Maintenance Checklist

The following checklist shows preventive maintenance procedures for Projector PH–637(*)/PFP. The list contains information on what to check, when to check, how to check, and precautions to be taken before, during, and after checking.

Item No.	What to check	When to check	How to check	Precautions
1	Projector, case, and accessories.	Daily	Check for completeness. Be sure that the aperture plate holder and aperture plates are available. See that the power cable is attached either to the projector or stored in the case. Check the roll attachment (PH-637/PFP only) to either see that both units are attached to the projector or stored in the case.	
2	Outer surfaces of projector, case, and accessories.	Daily	Check for cracks, chipped paint, rust, mildew, fungi, loose or missing screws, dents, and moisture. Clean metal surfaces by wiping them with a clean, lint-free cloth. Wipe the projection-head window and projection-stage plate-glass cover with a damp, clean, lint-free cloth. Dry thoroughly. Dust the projection lens with a camel's-hair brush. If fingerprints or foreign matter remain, clean the lens with lens tissue moistened with lens cleaner. Tighten loose screws, and replace missing screws.	Be careful not to scratch glass surfaces. Never clean the lens with anything but a camel's-hair brush and lens tissue. Do not touch the lens surfaces with the fingers. Tighten screws only handtight.
3	Interior of projector	Weekly	Open the rear door and lamp house door. Remove the projection lamp, and wipe it clean with a lint-free cloth. Use a camel's-hair brush and then lens tissue (with lens cleaner, if necessary) to clean the reflector surface and rear surface of the condenser lens. Replace the lamp, and close both doors.	Be careful not to scratch or break the reflector or the condenser lens.

Item No.	What to check	When to check	How to check	Precautions
			Open the door on the left side of the projector. Dust the rear surface mirror, the front surface of the condensing lens, and the bottom of the Fresnel condenser lens with a camel's-hair brush. If foreign matter remains, use lens tissue moistened with lens-cleaner to clean them thoroughly.	Be careful not to scratch or break the mirror and the lenses.
4	Projection lamp and blower motor.	Weekly	Turn the power switch to the ON position to be sure that the projection lamp and blower motor operate satisfactorily. Replace the lamp if it is defective. If the motor does not function satisfactorily, inspect the motor brushes. Replace them if they are defective.	If the projector is not used daily, the projection lamp and blower should be turned on for about 10 minutes every day to prevent moisture from accumulating in the equipment.
5	Control knobs	Weekly	Turn the focusing knob and the elevating knob back and forth to be sure that they operate smoothly and without binding, and that they hold the position at which they are set. Be sure that the head-support-post clamping knob holds the post securely in position.	Be sure that the setscrews in the knobs are tight.

38. Use of Preventi

a. This information i
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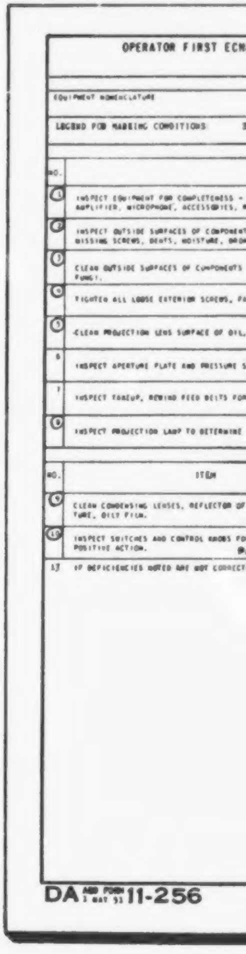


OPERATOR FIRST ECH

EQUIPMENT NOMENCLATURE

LEGEND FOR MARKING CONDITIONS

NO.	
①	INSPECT EQUIPMENT FOR COMPLETENESS – AMPLIFIER, MICROPHONE, ACCESSORIES,
②	INSPECT OUTSIDE SURFACES OF COMPONENT MISSING SCREWS, DENTS, MOISTURE, BROK
③	CLEAN OUTSIDE SURFACES OF COMPONENTS FUNGI.
④	TIGHTEN ALL LOOSE EXTERIOR SCREWS, PA
⑤	CLEAN PROJECTION LENS SURFACE OF OIL,
6	INSPECT APERTURE PLATE AND PRESSURE S
7	INSPECT TAKEUP, REWIND FEED BELTS FOR
⑧	INSPECT PROJECTION LAMP TO DETERMINE

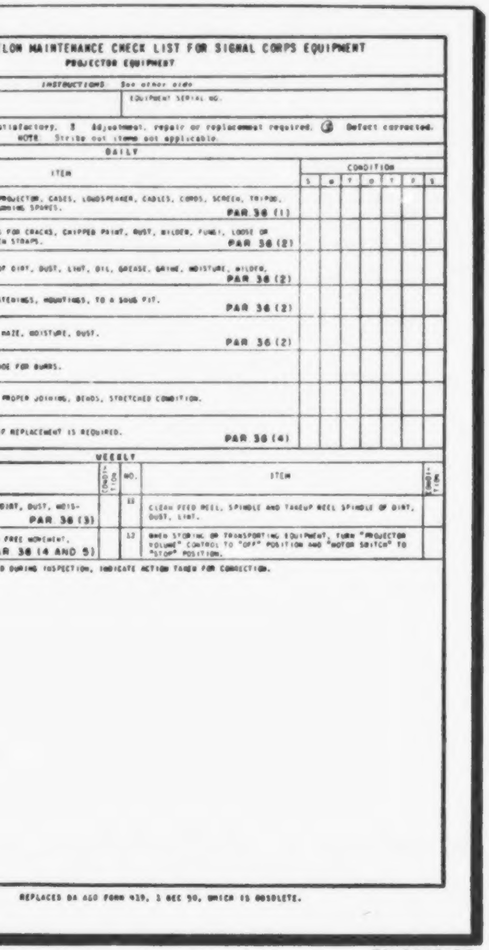
NO.	ITEM
⑨	CLEAN CONDENSING LENSES, REFLECTOR OF TURE, OILY FILM.
⑩	INSPECT SWITCHES AND CONTROL KNOBS FO POSITIVE ACTION.
11	IF DEFICIENCIES NOTED ARE NOT CORRECT

DA FORM 1 MAY 53 11-256

F

ve Maintenance Forms

s presented as a guide to the individual making
quipment in accordance with instructions on
11-257 (figs. 22 and 23). The decision as to
n are applicable to this equipment is a tactical
the case of first echelon maintenance by the
chief or his designated representatives, and in
third echelon maintenance, by the individual
Instructions for the use of each form appear
e form.



LON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
PROJECTOR EQUIPMENT

INSTRUCTIONS: See other side

EQUIPMENT SERIAL NO.

tisfactory. X Adjustment, repair or replacement required. ⊗ Defect corrected.
NOTE: Strike out items not applicable.

DAILY

ITEM	CONDITION						
	S	M	T	W	T	F	S
ROJECTOR, CASES, LOUDSPEAKER, CABLES, CORDS, SCREEN, TRIPOD, NNING SPARES. PAR 36 (1)							
S FOR CRACKS, CHIPPED PAINT, RUST, MILDEW, FUNGI, LOOSE OR N STRAPS. PAR 36 (2)							
F DIRT, DUST, LINT, OIL, GREASE, GRIME, MOISTURE, MILDEW, PAR 36 (2)							
TENINGS, MOUNTINGS, TO A SNUG FIT. PAR 36 (2)							
HAZE, MOISTURE, DUST. PAR 36 (2)							
OE FOR BURRS.							
PROPER JOINING, BENDS, STRETCHED CONDITION.							
F REPLACEMENT IS REQUIRED. PAR 36 (4)							

WEEKLY

	CONDITION	NO.	ITEM	CONDITION
DIRT, DUST, MOIS- PAR 36 (3)		11	CLEAN FEED REEL, SPINDLE AND TAKEUP REEL SPINDLE OF DIRT, DUST, LINT.	
FREE MOVEMENT. R 36 (4 AND 5)		12	WHEN STORING OR TRANSPORTING EQUIPMENT, TURN "PROJECTOR VOLUME" CONTROL TO "OFF" POSITION AND "MOTOR SWITCH" TO "STOP" POSITION.	

D DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

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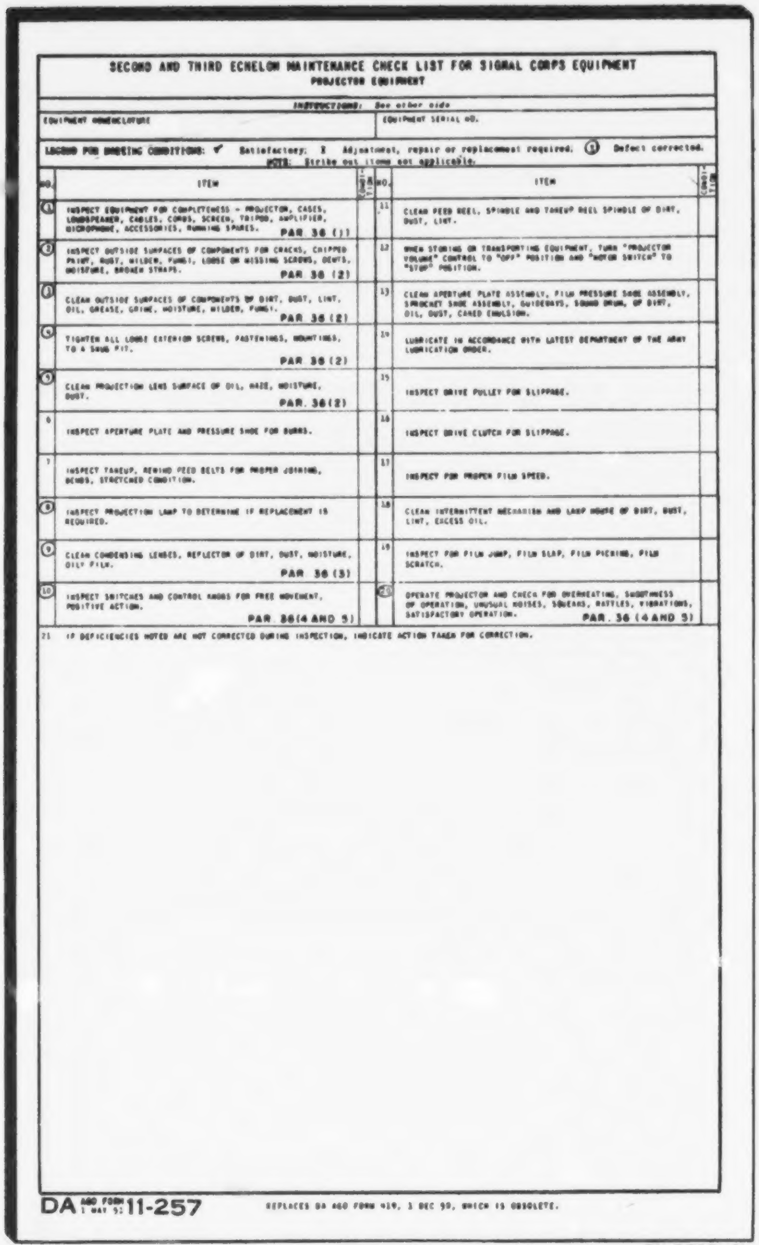
igure 22. DA Form 11-256.



SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
PROJECTOR EQUIPMENT

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE

EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; ① Defect corrected.
NOTE: Strike out items not applicable.

NO.	ITEM	CONDITION	NO.	ITEM	CONDITION
①	INSPECT EQUIPMENT FOR COMPLETENESS – PROJECTOR, CASES, LOUDSPEAKER, CABLES, CORDS, SCREEN, TRIPOD, AMPLIFIER, MICROPHONE, ACCESSORIES, RUNNING SPARES. PAR 36 (1)		11	CLEAN FEED REEL, SPINDLE AND TAKEUP REEL SPINDLE OF DIRT, DUST, LINT.	
②	INSPECT OUTSIDE SURFACES OF COMPONENTS FOR CRACKS, CHIPPED PAINT, RUST, MILDEW, FUNGI, LOOSE OR MISSING SCREWS, DENTS, MOISTURE, BROKEN STRAPS. PAR 36 (2)		12	WHEN STORING OR TRANSPORTING EQUIPMENT, TURN "PROJECTOR VOLUME" CONTROL TO "OFF" POSITION AND "MOTOR SWITCH" TO "STOP" POSITION.	
③	CLEAN OUTSIDE SURFACES OF COMPONENTS OF DIRT, DUST, LINT, OIL, GREASE, GRIME, MOISTURE, MILDEW, FUNGI. PAR 36 (2)		13	CLEAN APERTURE PLATE ASSEMBLY, FILM PRESSURE SHOE ASSEMBLY, SPROCKET SHOE ASSEMBLY, GUIDEWAYS, SOUND DRUM, OF DIRT, OIL, DUST, CAKED EMULSION.	
④	TIGHTEN ALL LOOSE EXTERIOR SCREWS, FASTENINGS, MOUNTINGS, TO A SNUG FIT. PAR 36 (2)		14	LUBRICATE IN ACCORDANCE WITH LATEST DEPARTMENT OF THE ARMY LUBRICATION ORDER.	
⑤	CLEAN PROJECTION LENS SURFACE OF OIL, HAZE, MOISTURE, DUST. PAR. 36 (2)		15	INSPECT DRIVE PULLEY FOR SLIPPAGE.	
6	INSPECT APERTURE PLATE AND PRESSURE SHOE FOR BURRS.		16	INSPECT DRIVE CLUTCH FOR SLIPPAGE.	
7	INSPECT TAKEUP, REWIND FEED BELTS FOR PROPER JOINING, BENDS, STRETCHED CONDITION.		17	INSPECT FOR PROPER FILM SPEED.	
⑧	INSPECT PROJECTION LAMP TO DETERMINE IF REPLACEMENT IS REQUIRED.		18	CLEAN INTERMITTENT MECHANISM AND LAMP HOUSE OF DIRT, DUST, LINT, EXCESS OIL.	
⑨	CLEAN CONDENSING LENSES, REFLECTOR OF DIRT, DUST, MOISTURE, OILY FILM. PAR 36 (3)		19	INSPECT FOR FILM JUMP, FILM SLAP, FILM PICKING, FILM SCRATCH.	
⑩	INSPECT SWITCHES AND CONTROL KNOBS FOR FREE MOVEMENT, POSITIVE ACTION. PAR. 36 (4 AND 5)		⑳	OPERATE PROJECTOR AND CHECK FOR OVERHEATING, SMOOTHNESS OF OPERATION, UNUSUAL NOISES, SQUEAKS, RATTLES, VIBRATIONS, SATISFACTORY OPERATION. PAR. 36 (4 AND 5)	

21 IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

DA AGO FORM 1 MAY 52 11-257 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

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Figure 23. DA Form 11-257.

b. This manual contains preventive maintenance information that will aid in completing the forms; pertinent instructions in the manual are cross referenced to item numbers of the forms in figures 22 and 23.

39. Lubrication

Projector PH-637(*)/PFP has been lubricated at the factory and, with one exception, further lubrication of the equipment is not necessary. When the equipment is in daily use, the support post (column) (fig. 2) which supports the projector head should be wiped with an oily rag about once a month to remove any grit or dirt which may have accumulated and to prevent binding of the projection-head tube on the support post.

Section II. WEATHERPROOFING

40. General

Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

41. Tropical Maintenance

A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72.

42. Winter Maintenance

Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66.

43. Desert Maintenance

Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained in TB SIG 75.

44. Lubrication

The effects of extreme heat or cold on materials and lubricants are explained in TB SIG 69. Observe all precautions in TB SIG 69 when operating equipment under conditions of extreme heat or cold. Refer to paragraph 39 for detailed instructions.

Section III. TROUBLESHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

45. General

The troubleshooting and repair that can be performed at the organizational maintenance level are limited in scope by the tools and replaceable parts available and by the existing tactical situation. This section will help the repairman to determine the cause of trouble and will suggest corrective action. A reference to chapter 6 indicates that the required repairs or adjustments should be made by field personnel and not by personnel at the organizational maintenance level.

46. Troubleshooting Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 47) will help to locate trouble in the equipment. The list gives the item to be checked, the normal indications of correct operation, and corrective measures that can be taken by the operator. *To use the list effectively, always follow the items in numerical sequence.*

b. Action or Condition. For some items, the information given in the action or condition column consists of switch or control settings under which the item is to be checked. For other items, it represents an action that must be taken to check the normal indication given in the normal indications column.

c. Normal Indications. The normal indications listed include visible and audible sounds that the operator should perceive when he checks the item. If these signs are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed are those which the operator can make without turning in the equipment for repairs. A reference in the table to chapter 6 indicates that troubleshooting by an experienced repairman is necessary. However, if the tactical situation requires that operation be maintained, and if the equipment is not completely inoperative, the operator must keep the projector in operation as long as it is possible to do so.

47. Equipment Performance Checklist

Item No.	Item	Action or condition	Normal indications	Corrective measures
1	Power cable	Connect to projector and to power source.	Power cable terminals fit securely in power receptacle and on projector receptacle.	Check all connectors. Straighten contacts, or bend them to increase tension, as necessary.
2	Shelf on front of projector (PH-637/PFP only) and shelf on left side of projector.	Raise to horizontal position.	Shelves stay in horizontal position and give firm support.	If the left-hand shelf does not stay in position, raise it, and pull the shelf support out by hand. If the front shelf does not stay up, raise it until the support legs snap into locked position.
3	Lens cap and power switch.	Remove lens cap. Throw to ON position.	Projection lamp lights and, after a few seconds, blower motor can be heard to operate.	Check power-cable connections. If blower motor operates, but lamp does not light, open rear door and lamp house door, and check to see that the lamp is secure in its socket. Refer to chapter 6.
4	Transparency	Place on projection stage	Image is projected on screen.	Be sure that projection lamp is lighted.
5	Screen image	Bring into focus by turning focusing knob.	Image is focused accurately.	Be sure transparency is held flat on projection stage.
6	Projector	Move laterally to center screen image.	Image is centered laterally.	
7	Elevating knob	Turn to center screen image vertically.	Image is centered vertically.	
8	Focusing knob	Turn until image is brought into sharp focus.	Screen image is sharp and clear.	Examine transparency to be sure that it is satisfactory for projection. Clean all glass surfaces (par. 37). Refer to chapter 6.
9	Power switch	Turn to OFF position	Projection lamp is turned off and blower motor ceases to operate.	Refer to chapter 6.

CHAPTER 4

AUXILIARY EQUIPMENT

48. Chemicals and Trays

Photographic chemicals, trays, and jars are used as necessary in the preparation of transparencies used with Projector PH-637(*)/PFP. The use of such equipment is explained in paragraphs 28 and 29.

49. Graphic Arts Materials

The graphic arts materials used in preparing transparencies for projection are listed in paragraph 26*a*. These materials will be found very helpful in preparing transparencies.

CHAPTER 5

THEORY

50. General

(fig. 24)

Projector PH–637(*)/PFP is essentially an optical projection system contained in a housing and a vertically adjustable projection head, which is attached to a vertical support post set in the housing. A projection stage on the top surface of the housing is used as a support

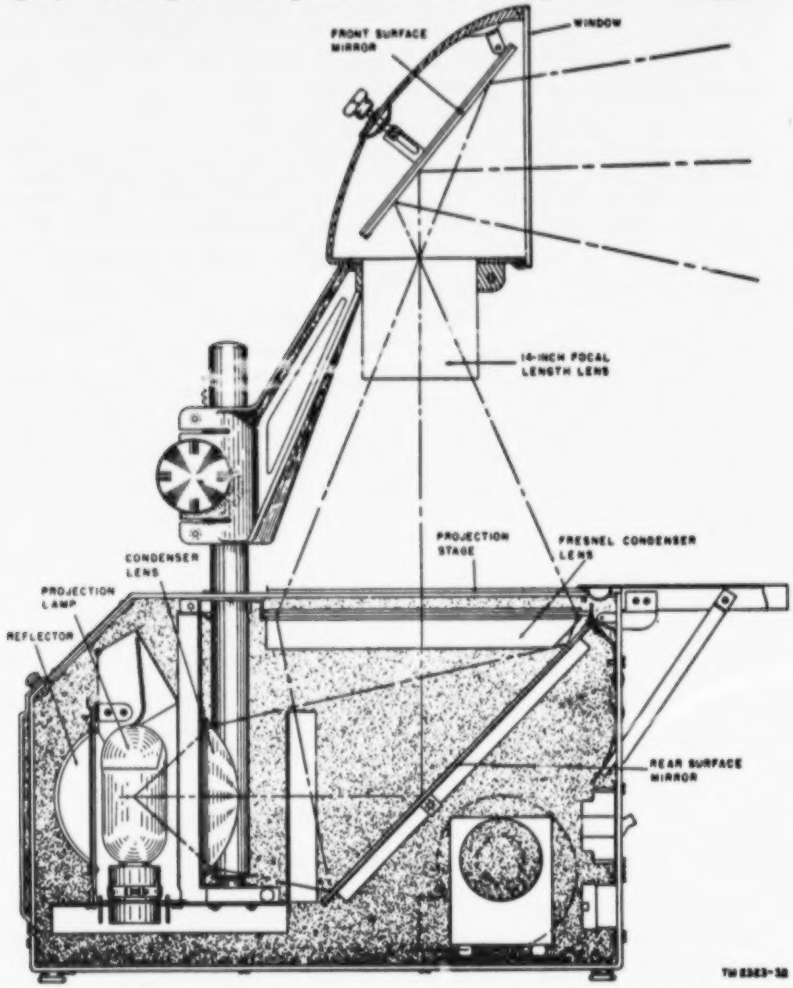
FRONT SURFACE MIRROR
WINDOW
14-INCH FOCAL LENGTH LENS
PROJECTION STAGE
FRESNEL CONDENSER LENS
CONDENSER LENS
PROJECTION LAMP
REFLECTOR
REAR SURFACE MIRROR
TM 5323-32

Figure 24. Functional diagram of projector PH–637(*)/PFP.

for transparencies to be projected. The optical system is designed so that the projected image appears on a screen behind and above the head of the operator or behind and slightly to one side of the operator.

51. Housing and Projection Head

a. Optical System. The optical system in the housing consists of a projection lamp, a reflector, a condenser lens, a rear surface mirror, a Fresnel condenser lens, and a projection stage. Light from the lamp is concentrated by the reflector and projected through the condenser lens to the rear surface mirror, which is installed at a 45° angle with reference to the Fresnel condenser lens. Light is reflected from the mirror through the Fresnel condenser lens, the plate-glass projection stage, and the transparency to be projected.

Note. The Fresnel condenser lens increases the brightness of the corners of the projected image. It is a thin sheet of molded transparent plastic on which the required convex thickness has been reduced by cutting concentric circular steps into the raised surface. The resultant saw-tooth ridges bend the oblique light rays so that they are directed towards the image field instead of cut off.

b. Blower. A blower system provides for cooling the projection lamp and housing. In Projector PH-637A/PFP, air from the blower is directed towards the lamp by a metal duct. The blower system consists of a motor, a fan, and a nozzle.

c. Power Supply (fig. 25). The projector operates from a 115- to 120-volt, 60-cycle, ac power source. On the front of the projector are a two-way ON-OFF switch and a male receptacle connector for the power cable. The receptacle and the switch are connected in series with the projection lamp, and the blower motor is connected in parallel.

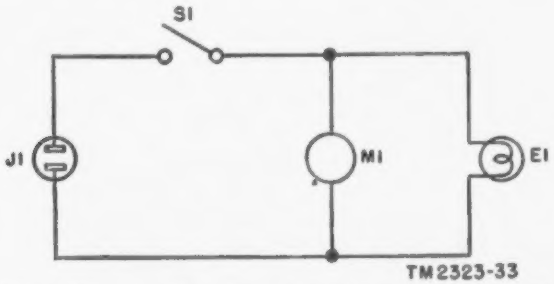

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Figure 25. Schematic diagram, projector PH-637(*)/PFP.

d. Roll Attachment. The roll attachment consists of a supply unit and a take-up unit. A roll of cellophane or plastic is inserted between rotating pivots on the supply unit, and the cellophane or plastic sheet is unrolled over the projection stage and attached to a roll on the take-up unit. If the cellophane or plastic material is slipped in next to the cutoff blade (PH–637/PFP only), it can be torn off for disposal. On Projector PH–637/PFP, the supply unit and the take-up unit are attached to the right and left sides of the projector housing, respectively. On Projector PH–637A/PFP, the roll attachment is built into the housing; the supply unit is set into the top front of the housing, and the take-up unit is set into the back. Anything written in grease pencil on the cellophane or plastic stretched on the projection stage will be projected on a screen so that the viewer sees on the screen what the writer sees on the projection stage.

e. Projection Head. The optical system in the projection head consists of a 14-inch focal length lens and a front surface mirror. The optical axis is centered over the optical axis of the housing. A window in the front of the head protects the mirror and lens from dirt, scratches, and breakage. Light from the projector housing is projected through the transparency on the projection stage and through the lens. It then is reflected from the front surface mirror to the projection screen for viewing. The entire projection head can be racked up and down on the vertical support post to focus the image. The vertical angle of the front surface mirror can be varied to center the image on the screen.

f. Aperture-Plate Holder and Aperture Plates. An aperture-plate holder and aperture plates are supplied to mask transparencies of various sizes. The holder is screwed to the top of the housing over the plate-glass cover, and the appropriate aperture plate fits on top of the holder.

CHAPTER 6

FIELD MAINTENANCE INSTRUCTIONS

Note. **This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available and by the skill of the repairman.**

Section I. TROUBLESHOOTING

52. Tools, Test Equipment, and Materials Required for Field Maintenance

Item	*Signal Corps stock No.*
Brush, stiff bristle	6Z1415–1
Brush, camel's-hair, ½-inch	6Z1372
Screwdriver (TL–456/U)	6R15211A
Screwdriver (TL–105)	6R16410
Wrench, Allen	6R55075–2
Cloth, lint-free	6Z1989
Tissue, lens	6M751
Cleaner, liquid, lens	8A819
Stick, orange	6Z7360
Multimeter TS–352/U	3F4325–352
Photoelectric Foot Candle Meter ME–86/U	

Note. Tool Equipment TK–24/GF contains the tools necessary for field maintenance.

53. Preliminary Procedures

Before attempting repair of the equipment at the field maintenance level, carefully follow the procedures in paragraphs 37 and 47. If the equipment still fails to perform satisfactorily, refer to the troubleshooting chart (par. 54) to correct the difficuty.

54. Troubleshooting Chart

Symptom	Probable trouble	Correction
Projection lamp will not light.	Lamp leads not securely connected at socket or switch terminals.	Tighten connections.
	Defective lamp	Replace lamp.
	Open or short circuit	Locate and repair.
	Defective lamp socket	Replace socket.
Blower motor will not operate.	Motor leads not securely connected at motor or switch terminals.	Tighten connections.
	Open or short circuit in wiring leads.	Locate and repair.
	Defective motor	Replace motor.

Symptom	Probable trouble	Correction
Lamp will not light and blower motor will not operate.	Defective power cable	Repair or replace power cable.
	Switch leads not securely connected to projector receptacle connector.	Tighten leads.
	Open or short circuit in wiring leads.	Locate and repair.
	Defective receptacle connector.	Replace connector.
	Defective switch	Replace switch.
Projection lamp and motor continue to operate after switch is turned to the OFF position.	Defective switch	Replace switch.
Image cannot be focused sharply.	Optical system improperly alined, or optical elements scratched or broken.	Realine optical system as necessary. Replace broken or scratched elements.
Image is not sufficiently bright.	Dirt or dust in optical system.	Clean optical system thoroughly.
Blower motor causes excessive vibration.	Motor not satisfactorily shock-mounted.	Tighten or repair motor mountings.
	Defective motor or fan	Replace motor or fan, as necessary.

Section II. DISASSEMBLY AND REASSEMBLY

55. Projector Housing

a. Shelves.

(1) To remove the front shelf of the PH-637/PFP, first remove the two screws and washers that hold the shelf to the pencil-groove section. Then slide the shelf support legs out of the retaining holes in the front of the projector, and remove the shelf.

(2) To remove the shelf on the left side of the projector, remove the four screws (PH-637/PFP) and the three screws (PH-637A/PFP) that hold the shelf to the projector. To remove the shelf support, remove the two screws that hold the support to the housing.

(3) To replace the shelves, reverse the disassembly instructions given in (1) and (2) above.

b. Projection Stage Plate Glass and Fresnel Condenser Lens (figs. 26 and 27).

(1) *Projector PH–637/PFP.*

(*a*) First remove the pencil-groove section from the front of the projector housing by removing the two screws that hold it in place on each side and the single screw that holds it in place along the bottom. The front shelf need not be removed from the pencil-groove section.

(*b*) Remove the plate glass by sliding it out from between the retaining strips that hold it in place. If the glass cannot be moved easily, loosen the screws that hold one retaining strip in place.

(*c*) Remove the Fresnel condenser lens by sliding it out from between the grooves in which it rests. The Fresnel condenser lens is an expensive and fragile part of the optical system. Be careful not to scratch, bend, or break it.

(*d*) Replace the projection-stage plate glass and the Fresnel condenser lens by reversing the instructions given in (*a*) through (*c*) above. Be sure to replace the Fresnel condenser lens so that the convex side faces the projection lens.

(2) *Projector PH–637A/PFP.*

(*a*) Raise the housing cover until it is retained in the open position.

(*b*) Unscrew the two screws that hold the cover-glass retaining strip in position, and remove the retaining strip.

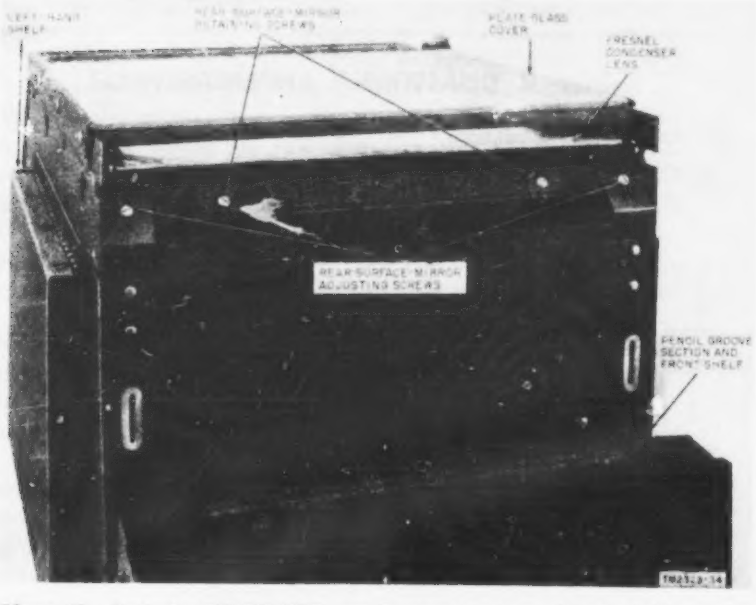
LEFT-HAND SHELF
REAR-SURFACE-MIRROR RETAINING SCREWS
PLATE GLASS COVER
FRESNEL CONDENSER LENS
REAR-SURFACE-MIRROR ADJUSTING SCREWS
PENCIL GROOVE SECTION AND FRONT SHELF

Figure 26. Projector PH–637/PFP, pencil-groove section and front shelf removed.

(*c*) Slide the glass cover out of the housing.

(*d*) Remove the Fresnel condenser lens by sliding it out from the grooves in which it rests. This lens is a valuable and fragile part of the projector and must be handled with care.

(*e*) To replace the plate-glass cover and the Fresnel condenser lens, reverse the disassembly instructions ((*a*) through (*d*) above). Be sure to replace the Fresnel condenser lens so that the convex side faces the projection lens.

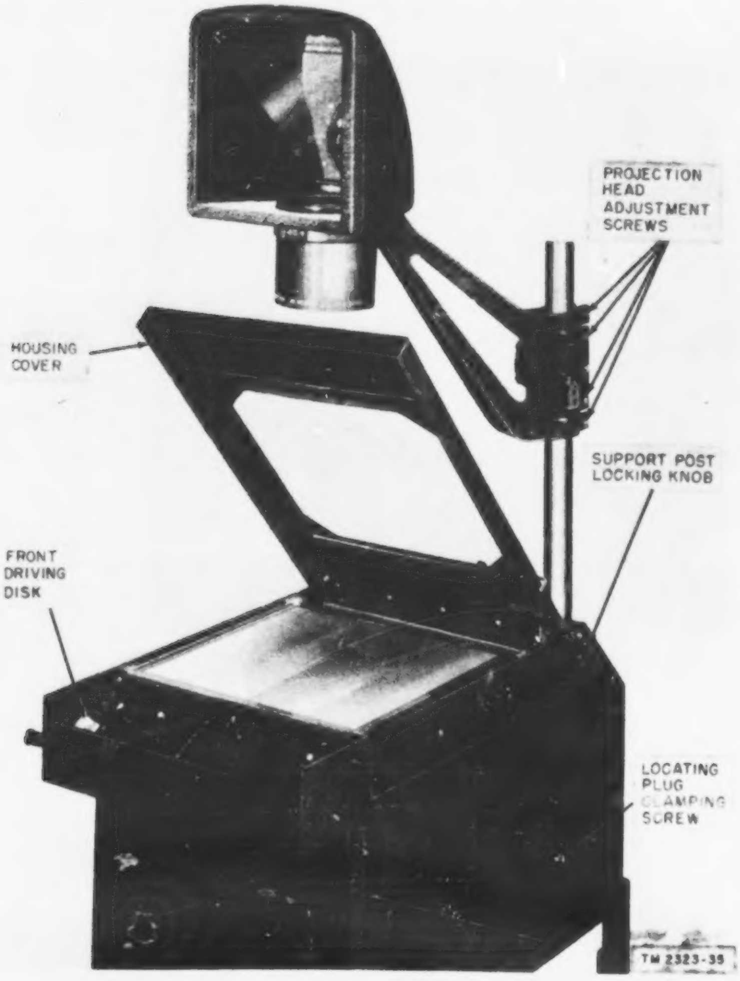
PROJECTION HEAD ADJUSTMENT SCREWS
HOUSING COVER
SUPPORT POST LOCKING KNOB
FRONT DRIVING DISK
LOCATING PLUG CLAMPING SCREW
TM 2323-39

Figure 27. Projector PH–637A/PFP, cover raised.

c. Reflector (fig. 28).

(1) Open the rear door of the projector. Unscrew and remove the knob at the upper left-hand corner of the reflector mounting. Hold the reflector carefully in place with one hand, and unscrew the screw at the lower right-hand corner of the mounting. Lift the reflector mounting out of the housing.

(2) The reflector is retained in the mounting by three clips, one of which is removable. Remove the screw from the clip,

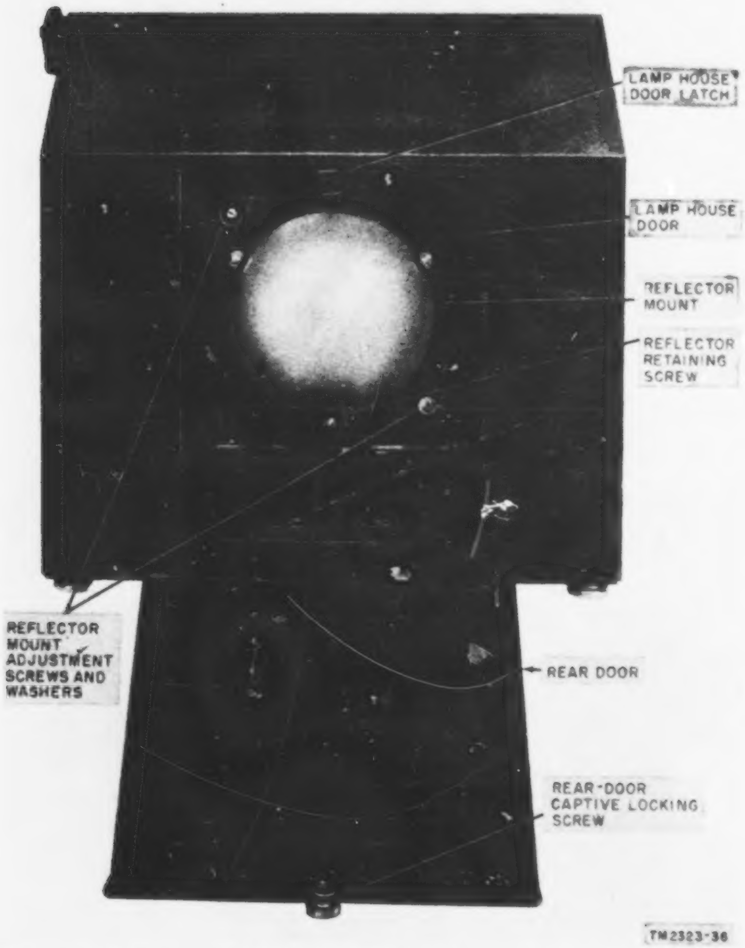
LAMP HOUSE DOOR LATCH
LAMP HOUSE DOOR
REFLECTOR MOUNT
REFLECTOR RETAINING SCREW
REFLECTOR MOUNT ADJUSTMENT SCREWS AND WASHERS
REAR DOOR
REAR-DOOR CAPTIVE LOCKING SCREW
TM2323-36

Figure 28. Rear view of PH-637(*)/PFP housing, rear door open, lamp house door closed.

then remove the clip, screw, nut, and washer. Be careful that the reflector does not fall and break. Now slide the reflector out from under the other two retaining clips.

(3) To replace the reflector, reverse the instructions given in (1) and (2) above.

Caution: When the reflector mounting is removed and replaced, the reflector must be re-alined (par. 59*e*).

d. Glass Condenser.

(1) Open the door on the left-hand side of the projector housing.

(2) Unscrew the captive screw that holds the condenser mounting plate in place, and use the screw to pull the mounting plate carefully out through the door.

(3) The condenser (for the PH–637/PFP) is held in the mounting plate by four guides welded to the plate and by associated clips and screws. Unscrew two adjacent screws, and remove the screws and clips. Then slide the condenser carefully from the mounting plate. The condenser for the PH–637A/PFP is held in place by four clips. To remove the condenser, push two clips to one side and slide the condenser from the mounting plate.

(4) To replace the condenser, reverse the disassembly instructions given in (1) through (3) above.

Caution: When the condenser mounting and the condenser are removed and replaced, check optical alinement of the projector (par. 59) to be sure that no adjustment is required.

e. Lamp Socket (figs. 29 and 30).

(1) Open the rear door of the projector, and then open the lamp house door. Remove the projection lamp from its socket.

(2) Rack the projection head up off the vertical support post, and set it carefully to one side.

(3) Lay the projector on its side on a level working space.

(4) Remove the bottom cover plate by removing the eight screws that hold it to the projector.

(5) For the PH–637/PFP only, remove the two screws, washers, and base cover from the base of the lamp socket.

(6) Unscrew the two terminal screws and remove the wiring-lead terminal clips.

(7) Reach in through the rear door of the projector, and use an Allen wrench to loosen the screw that locks the socket retaining ring in place. Slide the socket out of the ring.

(8) To replace the lamp socket, reverse the instructions given in (1) through (7) above. Before the socket retaining ring screw is tightened, the lamp must be alined with reference to the condenser lens (par. 59*c*).

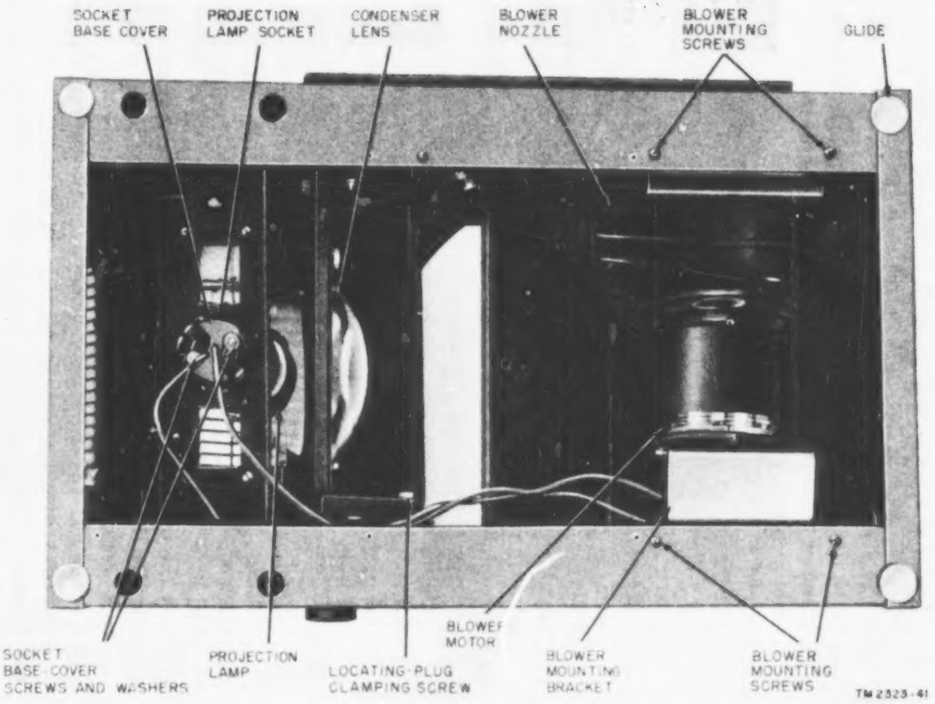
SOCKET BASE COVER
PROJECTION LAMP SOCKET
CONDENSER LENS
BLOWER NOZZLE
BLOWER MOUNTING SCREWS
GLIDE
SOCKET BASE-COVER SCREWS AND WASHERS
PROJECTION LAMP
LOCATING-PLUG CLAMPING SCREW
BLOWER MOTOR
BLOWER MOUNTING BRACKET
BLOWER MOUNTING SCREWS
TM 2323-41

Figure 29. Projector PH–637/PFP, bottom view, cover removed.

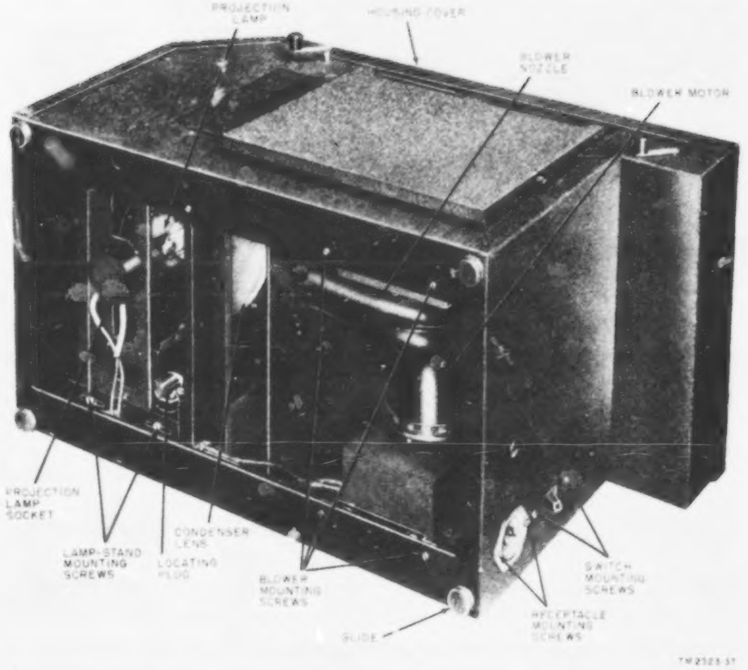
PROJECTION LAMP
HOUSING COVER
BLOWER NOZZLE
BLOWER MOTOR
PROJECTION LAMP SOCKET
LAMP-STAND MOUNTING SCREWS
LOCATING PLUG
CONDENSER LENS
BLOWER MOUNTING SCREWS
SLIDE
SWITCH MOUNTING SCREWS
RECEPTACLE MOUNTING SCREWS
TM2323-31

Figure 30. Projector PH-637A/PFP, bottom view, cover removed.

f. Motor and Fan (fig. 31).

(1) Follow the instructions in *e*(2) through (4) above.

(2) Unscrew the four screws that hold the motor mountings to the base of the projector. Hold the motor with one hand, and remove the screws, nuts, and washers. Lift the motor carefully out of the projector.

(3) To remove the motor mountings, remove the two screws that hold the mounting to the blower end and the two nuts that hold the mounting to the motor end.

(4) To remove the shock mounts from the motor mountings, remove the cotter pin from each shock-mount shaft, and slide out the shaft. Be careful not to lose the three rubber washers that fall free as the shaft is withdrawn.

(5) To remove the fan, use an Allen wrench to loosen the setscrew that holds the fan in place on the motor shaft. Then slide the fan from the shaft.

(6) To replace the motor and fan, reverse the disassembly instructions given in (1) through (5) above. Be sure to replace the motor in the projector housing so that the blower nozzle faces the projection lamp.

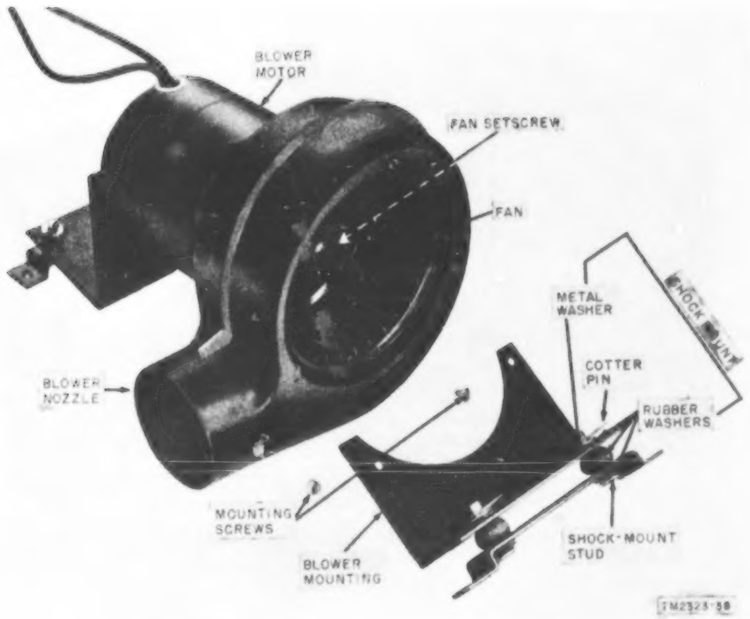
BLOWER MOTOR
FAN SETSCREW
FAN
METAL WASHER
SHOCK MOUNT
COTTER PIN
RUBBER WASHERS
BLOWER NOZZLE
MOUNTING SCREWS
BLOWER MOUNTING
SHOCK-MOUNT STUD
TM2323-58

Figure 31. Blower assembly, one mounting removed.

Note. **The PH–637A/PFP has a duct fastened with clips to the inside of the bottom cover. This duct directs the air in a controlled flow from the blower to the lamp area.**

g. Power Switch (fig. 30).

(1) Follow the instructions in *e*(2) through (4) above.

(2) Unscrew the two screws that hold the switch in place on the front of the projector housing. Reach through the bottom of the projector housing to hold the switch in position while removing the screws.

(3) Withdraw the switch from the housing as far as the leads will permit, and unscrew the two terminal screws that hold the lead clips to the switch. Remove the switch.

(4) Replace the switch by reversing the disassembly instructions given in (1) through (3) above.

h. Power-Cable Receptacle Connector (fig. 30).

(1) Follow the instructions in *e*(2) through (4) above.

(2) Unscrew the two screws and nuts that hold the connector in place on the front of the projector housing. Reach through the bottom of the projector housing to hold the connector in position while removing the screws and nuts.

(3) Withdraw the connector from the housing as far as the leads

will permit, and unscrew the two terminal screws that hold the lead clips to the connector. Remove the connector.

(4) Replace the connector by reversing the disassembly instructions given in (1) through (3) above.

i. Rear Surface Mirror and Mirror Support.

(1) Remove the projection-stage plate glass and the Fresnel condenser lens (*b* above).

(2) Remove the two screws that hold the mirror retaining strip in place at the top front of the housing (fig. 26) and remove the retaining strip. Slide the mirror carefully up and out of the housing.

(3) To remove the mirror support, first unscrew and remove the two screws that hold the support in place on the sides of the housing. Then unscrew and remove the two screws that hold the support in place at the top front of the housing. Lift the support out of the housing.

(4) To replace the rear surface mirror and the mirror support, reverse the disassembly instructions given in (1) through (3) above. Whenever the mirror support is removed, the mirror must be realined (par. 59*d*(2)).

j. Glide (fig. 30). To remove a glide, unscrew the nut that holds it in place at the inner corner of the housing, and pull the glide from the housing. To replace a glide, slide the glide shaft into the hole at the corner of the projector housing, and replace the nut on the shaft from inside the housing.

k. Support-Post Clamping Knob. To remove the support-post clamping knob, use an Allen wrench to loosen the two setscrews in the collar of the knob. Then pull the knob from the shaft. To replace the knob, push it on the shaft, and then tighten the two setscrews.

l. Roll Attachment Crank (fig. 32). If the crank is attached to the PH-637A/PFP, first raise the housing cover until it is retained in the

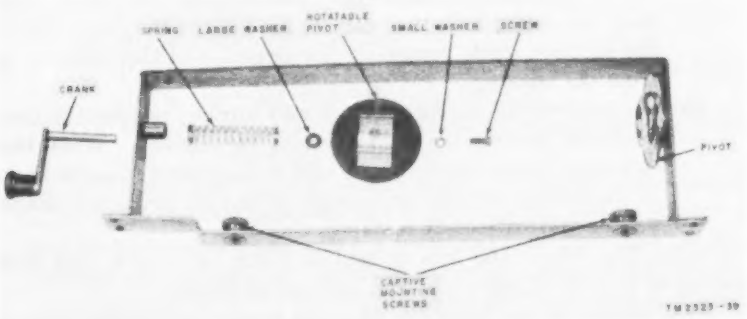

Figure 32. Roll attachment crank disassembled.

open position. To remove the crank from either projector, unscrew the screw in the head of the crankshaft. Pull the crank out of its mounting hole in the role attachment, and catch the rotatable pivot, tension spring, and two washers as they fall free. To replace the crank, slide the crankshaft into the mounting hole on the roll attachment. Then slide the tension spring, the large washer, the pivot, and the small washer on the shaft, and replace the screw in the head of the shaft.

56. Projection-Head Assembly
(fig. 33)

a. Window. Remove the two screws that hold the window frame to the bottom of the mirror housing. Then hold the window frame in place, and remove the screw that holds the frame to the top of the housing. Lift the window and frame carefully off the housing. To remove the window, remove the strips of tape that hold it to the frame. To replace the window and the window frame, tape the window in place on the inside of the frame, set the frame back on the mirror housing, and replace the three screws.

b. Front Surface Mirror and Mirror Support.

(1) First remove the window (*a* above).

(2) Remove the two screws and spring clips that hold the mirror to the top of the mirror support. While removing the screws, hold the mirror in position. Hold a chamois or clean, lint-free cloth between the hand and the mirror so that the mirror will not be spotted.

(3) Slide the mirror out of the groove in which it rests at the bottom of the support.

Caution: Handle the mirror carefully. The reflecting surface of the mirror is coated, and the coating is not protected. Clean the mirror only when absolutely necessary.

(4) Unscrew and remove the elevation screw by turning the elevation knob counterclockwise. Remove the two screws that hold the support to the rear of the mirror housing. Hold the support while removing the screws, and then remove it from the housing.

(5) To replace the mirror support and mirror, reverse the disassembly instructions ((1) through (4) above). When the elevation knob is replaced, be sure it is screwed into the back of the mirror support far enough so that the projected image will be approximately centered.

c. Lens (fig. 33). The lens is held in place by a split ring and locking screw. To remove the lens, proceed as follows:

(1) Loosen the two front screws in the support arm flange around the upper part of the lens.

(2) Hold the lens firmly in one hand, and unscrew the locking screw that tightens the split ring around the lens. It should now be easy to twist the lens out of the projection head. If the lens cannot be removed easily, force the jaws of the split ring apart with a heavy screwdriver.

Caution: Be sure that the lens is always well supported while it is being removed. If it should drop, the projection-stage plate glass, the Fresnel condenser lens, and possibly the rear surface mirror would be broken, and the projection lens might be damaged permanently.

(3) To replace the lens, reverse the disassembly instructions ((1) and (2) above). When the lens is inserted in the split ring, be sure to push it up until it butts against the bottom of the front surface mirror housing. Do not tighten the split-ring locking screw too much; severe constriction may damage the lens.

Note. MWO SIG 11-2323-1 provides for the modification of the lens installation in the split ring and prevents damage to the lens, condenser, and glass cover plate which may be caused by the lens falling from the projection head. The modification calls for the insertion of a No. 6-32 by ¼-inch fillister head machine screw through a tapped hole in the metal part of the lens assembly (lens assembly barrel). This screw secures the lens in the projection-head housing and prevents the lens assembly from dropping out. When the lens is disassembled from the split ring, this screw must be removed before the lens can be withdrawn from the retaining ring. Loosen the screw in the retaining ring so that the lens barrel can be pushed upward slightly. Take the window from the projection-head assembly by removing the three screws holding it in place (two at the bottom and one at the top). The No. 6-32 by ¼-inch fillister head machine screw now may be removed from the lens barrel with a screwdriver. While removing the screw, hold the lens assembly so that it will not drop out. When the screw is removed, pull out the lens assembly.

d. Support Arm.

(1) Remove the projection-head assembly by racking it up off the support post.

(2) Remove the lens (*c* above).

(3) Remove the three screws and washers that secure the support arm to the front surface mirror housing.

(4) To replace the support arm, reverse the disassembly instructions ((1) through (3) above).

e. Elevation Knob and Focusing Knob. To remove the elevation knob, loosen the two setscrews in the collar of the knob, and slide the knob off the shaft. To remove the focusing knob, loosen the two Allen setscrews in the collar of the knob, and slide the knob off the shaft. To replace either knob, slide it back on the shaft and tighten the setscrews securely.

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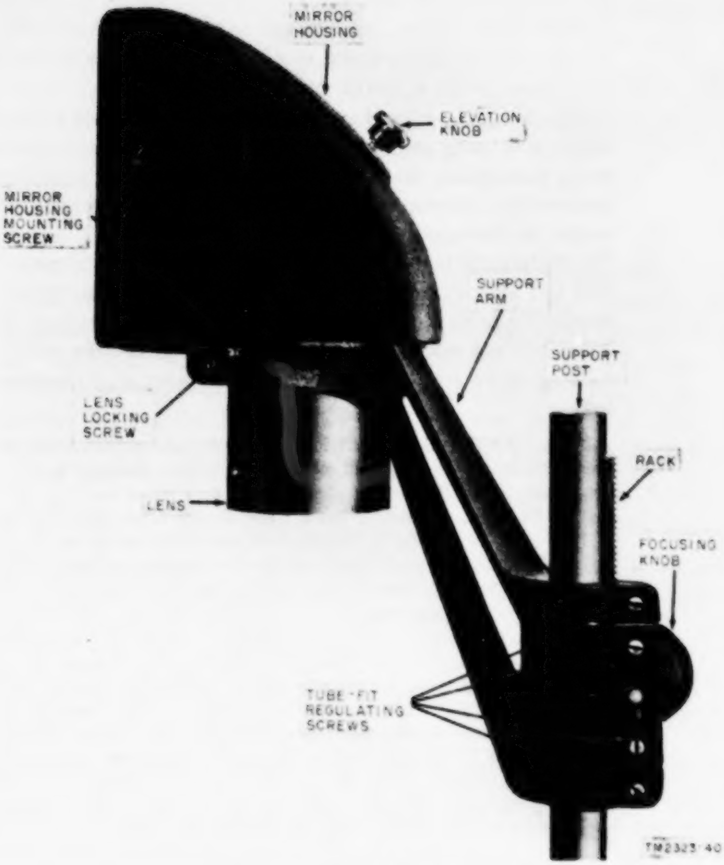
MIRROR HOUSING
ELEVATION KNOB
MIRROR HOUSING MOUNTING SCREW
SUPPORT ARM
SUPPORT POST
LENS LOCKING SCREW
RACK
LENS
FOCUSING KNOB
TUBE-FIT REGULATING SCREWS
TM2323-40

Figure 33. Projection-head assembly.

Section III. ADJUSTMENTS AND ALINEMENT

Caution: Be careful when adjusting and alining the projector. The interior is *very hot* when the projection lamp is turned on. Wear gloves or use a thick cloth to cover the hands when handling components inside the unit.

57. General

Operate the projector. If a good, clear image appears on the screen, the projector is adjusted satisfactorily and alinement should not be disturbed. If the projected image is not satisfactory, adjust the projector in accordance with the instructions in paragraphs 58 and 59.

58. Minor Adjustments

a. Keystone Effect. Refer to the note in paragraph 14*b*.

b. Lopsided Screen. The screen image will be lopsided when the projector faces the screen at an angle instead of straight on. If the projector faces the screen squarely and the image still is lopsided, loosen the three screws that hold the front surface mirror housing to the support arm, and shift the mirror housing to the left or right until the top and bottom edges of the image are horizontal. Then tighten the three screws.

c. Fit of Projection Head on Support Post. The fit of the projection head on the support post has been carefully adjusted at the factory and should not be changed unless it is absolutely necessary. If adjustment is required to prevent the projection head from moving sideways, tighten the screws on the support-arm tube. The top and bottom screws regulate the fit of the tube on the support post. The two inner screws regulate the fit of the split portion of the tube against the sides of the support-post rack (fig. 33).

59. Optical Alinement

a. Set the projector up (par. 11) about 15 feet from the projection screen so that the projector faces the screen squarely.

b. Turn the power switch to the ON position. Place a transparency on the projection stage and focus it as sharply as possible on the screen. Then turn the power switch to the OFF position and remove the transparency from the projection stage.

c. Open both the rear door of the projector housing and the lamp house door. Loosen the projection-lamp socket clamping screw, and move the socket carefully up or down until the center of the lamp filament is in a direct line with the center of the condenser lens. Be sure that the center of the eye, the center of the filament, and the center of the condenser lens are in a straight line. Tighten the socket clamping screw.

d. Without closing the rear door or the lamp house door, turn the power switch to the ON position again. Hold a sheet of white paper against the bottom of the lens; be sure that the light reflected into the lens from the projector housing is not obstructed by the hands. Look in through the projection-head window, and observe whether or not the octagon of light visible on the paper is centered with reference to the lens.

(1) If there is a lateral displacement, loosen the support-post clamping screw and loosen the support-post locating-plug clamping screw (fig. 29 for PH-637/PFP and fig. 27 for PH-637A/PFP). Hold the paper against the bottom of the lens again, and move the projection-head assembly to the left or right until the octagon of light visible on the

paper is centered laterally with reference to the lens. Then tighten the support-post clamping screw and the support-post locating-plug clamping screw.

(2) If there is a displacement from front to back, raise the housing cover (PH–637A/PFP) or remove the pencil-groove section from the front of the housing (PH–637/PFP). Then loosen the rear surface mirror adjusting screws, and adjust the position of the mirror up or down until the octagon of light visible on the paper is centered with reference to the lens. Tighten the adjusting screws, and lower the housing cover (PH–637A/PFP) or replace the pencil-groove section (PH–637/PFP).

e. Close the lamp house door, and latch it in place. Loosen the two screws that hold the reflector mounting plate in place. While observing the image on the projection screen, move the reflector mounting plate both vertically and horizontally until a screen image with the best overall brightness characteristics is obtained. Tighten the two screws at this position.

Note. If the image shows brown or blue corners, the corners should be of the same size and symmetrically placed.

f. Place a transparency on the projection stage, focus the projector until the projected image is sharp, and then remove the transparency.

(1) If the corners of the blank screen image are blue, the lamp is too close to the condenser lens.

(2) If the corners are brown, the lamp is too far from the condenser lens.

(3) If the conditions mentioned in (1) or (2) above are present, proceed as follows:

(*a*) Grasp the projector by the projection-head support arm, and tilt it to one side. Then insert a screwdriver through the two holes in the bottom cover plate, and loosen the two lamp-stand mounting screws (fig. 30). Tilt the projector to the other side, insert a screwdriver through the two holes in that side of the bottom cover plate, and loosen the other two lamp-stand mounting screws. Set the projector back in the normal position.

(*b*) Reach in through the rear door of the projector housing. If the corners of the screen image are blue, move the lamp stand back slightly until the blue disappears. If the corners are brown, move the lamp stand forward slightly until the brown disappears. Adjust the lamp stand to a position where the best combination of clear screen image and sharp definition is obtained.

Caution: Be careful not to touch the projection lamp.

(*c*) Close the rear door of the housing. Be very careful not to disturb the adjusted position of the lamp stand. Then tilt the projector carefully to one side, and tighten two lamp-stand mounting screws through the holes in the bottom cover plate. Tilt the projector to the other side and tighten the other two lamp-stand mounting screws through the holes in that side of the bottom cover plate.

Section IV. FINAL TESTING

60. Test Conditions

a. Tests must be conducted in a darkened room at normal room temperature.

b. The line voltage used must be 117-volt (±3 volts), 60-cycle ac.

c. All screen images used in testing the projector must be projected on a suitable, white, matte screen.

d. Either a 500- or a 1,000-watt, T–20 projection lamp must be used in making the tests.

e. When tests are made, the projector must be placed on a table or stand that will insure minimum vibration.

61. Mechanical and Optical Requirements

a. Elevation Knob. When the elevation knob is turned, it should adjust the angular position of the front surface mirror smoothly and continuously throughout its range.

b. Focusing Control. When the focusing knob is turned, it should focus the projector head accurately. The focusing control should maintain the focusing adjustment at any specific position within its range.

c. Support-Post Clamping Knob. When this knob is turned clockwise as far is it will go, the clamping knob should hold the support post securely in position.

d. Support Post. The notched end of the support post should fit firmly over the pin on the locating plug at the bottom of the projector housing. When it is in position, the post should not rotate on its axis.

e. Shelves. The side shelf of the PH–637A/PFP and the front and side shelves of the PH–637/PFP should lock securely in place when raised to the horizontal position.

f. Reflector. The reflector must be positioned vertically and horizontally to insure optimum illumination along the optical axis.

g. Blower Assembly. The blower assembly must be securely mounted to insure minimum vibration when it is in operation. The condition of the fan must insure a maximum volume of cooling air in dynamic balance.

62. Electrical Requirements

Use Multimeter TS–352/U to measure resistance across one contact of the power-cable receptacle connector and the metal frame of the projector housing. The power switch should be turned to the ON position, but the power cable should not be connected to the power source. The resistance measured should not be less than 2 megohms.

63. Operational Tests

a. Illumination Test.

(1) Mask the plate-glass projection stage cover to provide an 8- by 8-inch aperture.

(2) Attach the power cable to the projector and to a 117-volt (±3 volts) ac power source, and turn the power switch to the ON position.

(3) Move the projector so that the projected screen image is at least 40 inches wide. Focus the projector sharply, and measure the screen image to see that it is still at least 40 inches wide.

(4) Divide the screen image into 9 equal squares. Use Photoelectric Foot Candle Meter ME–86/U to measure the light at the center of each square in foot candles.

(5) Calculate the arithmetical average of the illumination at the centers of the 9 squares. Multiply the average by the image area in square feet. The result (lumen output) must be not less than 1,280 lumens.

b. Focusing Test. With the power switch turned to the ON position, set the projector in such a position that the screen image is approximately 6 feet square. Place a transparency on the projection stage, and focus the image sharply. Then measure the image again to be sure that it is about 6 feet square. There should be no blur anywhere within the image area. Any blur indicates defective components or misalinement of the optical system. There should be no longitudinal or lateral chromatic aberration when the screen image is viewed from a distance equal to twice the width of the screen (12 feet).

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

64. Disassembly for Storage or Shipment

When the equipment is to be stored or reshipped, proceed as follows:

a. Remove the projection-head assembly by racking it to its maximum height and lifting it off the support post.

b. Remove the support post by turning the clamping knob counterclockwise one or two turns; then lift the support post from the hole in the top of the housing.

c. Remove the power cable from the receptacle connector on the front of the projector housing.

65. Repackaging for Storage or Shipment

a. Place the different components and accessories in the carrying case in accordance with the procedure given in paragraph 5*f* and figure 5. Close the cover and secure the two fasteners.

b. Repack the equipment according to the instructions in paragraph 8.

Section II. DEMOLITION TO PREVENT ENEMY USE

66. General

The demolition procedures given in paragraph 67 will be used to prevent the enemy from using or salvaging the equipment. Demolition of the equipment will be accomplished only upon order of the commander.

67. Methods of Destruction

a. Smash. Smash the carrying case, housing, projection head, lens, reflector, mirrors, condenser lenses, projection lamps, slides, and the plate-glass cover; use sledges, axes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut the power cable and all inside wiring; use axes, handaxes, or machetes.

c. Burn. Burn the cellophane rolls, lens tissue, and all other projection material; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend all metal parts.

e. Explosives. If explosives are necessary, use firearms, grenades or TNT.

f. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

g. Destroy. Destroy everything.

APPENDIX

REFERENCES

Note. For availability of items listed, check SR 310-20-3, SR 310-20-4, SR 310-20-5, and SR 310-20-7.

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1. Army Regulations

AR 380-5	Military Security (Safeguarding Security Information).
AR 750-5	Maintenance of Supplies and Equipment, Maintenance Responsibilities and Shop Operation.

2. Supply

SR 725-405-5	Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11-100	Serviceability Standards for Signal Equipment in Hands of Troops.

3. Painting, Preserving, and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TM 9-2851	Painting Instructions for Field Use.

4. Camouflage, Decontamination, and Demolition

FM 5-20	Camouflage, Basic Principles.
FM 5-25	Explosives and Demolitions.
TM 3-220	Decontamination.

5. Other Publications

SR 310-20-3	Index of Training Publications.
SR 310-20-4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SR 310-20-5	Index of Administrative Publications.
SR 310-20-7	Index of Tables of Organization and Equipment, Reduction Tables, Tables of Organization, Tables of Equipment, Type Tables of Distribution, and Tables of Allowances.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.

TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 149	Tropicalization of Photographic Equipment.
TB SIG 189	Cold Weather Photography.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.

6. Test Equipment References

TM 11–664	Theory and Use of Electronic Test Equipment.
TM 11–5527	Multimeter TS–352/U.

7. Photographic References

TM 11–404A	Photographic Print Processing Unit AN/TFQ–9.
TM 11–405	Processing Equipment PH–406.
TM 11–401	Elements of Signal Photography.
TM 11–2363	Darkroom PH–392.

8. Forms

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745–45–5 (Army), Navy Shipping Guide, Article 1850–4, and AFR 71–4 (Air Force).

b. DA Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700–45–5.

c. DD Form 535, Unsatisfactory Report, will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700–45–5 and AFR 65–26.

d. DA Form 11–256, Operator First Echelon Maintenance Check List for Signal Corps Equipment (Projector Equipment), will be prepared in accordance with the instructions printed on the back of the form (fig. 22).

e. DA Form 11–257, Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Projector Equipment), will be prepared in accordance with instructions printed on the back of the form (fig. 23).

f. Use other forms and records as authorized.

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☆ U.S. GOVERNMENT PRINTING OFFICE : 1990 0 - 261-872 (20725)

TM 11-2323 PROJECTORS, PH-637/PFP, AND PH-637A/PFP—1954

PIN : 016065-000